El Niño 2015/2016:

Impact Analysis of Past El Niños

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SECTION 1

Introduction

El Niño conditions are currently present in the Pacific and are forecast to develop into a strong event peaking later this year. Events such as this are a significant perturbation, or 'kick', to the climate system and can affect weather patterns globally. This report analyses El Niño events over the last 35 years and aims to identify regions where there is an increased likelihood of an impact occurring.

It is important to note, this analysis is based on past analogous events and is not a prediction for this year. No two El Niño events will be the same – the timing and magnitude of events differs considerably. More importantly, no two El Niño events lead to the same impacts – other local physical and social factors come into play. Therefore, the exact timings, locations and magnitudes of impacts should be interpreted with caution and this should be accounted for in any preparedness measures that are taken.

SECTION 2

What is El Niño and what do we expect this year?

2.1 Description of El Niño

The El Niño-Southern Oscillation (ENSO) is one of the most important phenomena in the Earth's climate system. It describes the year-to-year variations in ocean temperatures in the tropical Pacific. These variations influence weather patterns in the tropics but also have impacts on a global scale.

ENSO has three states - El Niño, La Niña and Neutral - described by the cycle between above and below normal sea-surface temperatures (SSTs) in the equatorial central and eastern Pacific. An El Niño state occurs when the SSTs in the central and eastern Pacific are substantially warmer than normal (e.g., 1997-98). Conversely, a La Niña state occurs when the SSTs are substantially colder than normal (e.g., 1988-89). A la Niña state often, but not always, follows El Niño conditions. Neutral conditions refer to the state when neither El Niño or La Niña is occurring and the SSTs in the equatorial Pacific are close to average (e.g., 2003-05). Several years of Neutral conditions can persist between La Niña and El Niño events.

El Niño and La Niña events tend to develop between April and June and tend to reach their maximum strength (or peak) during December to February. An event typically persists for 9-12 months and typically recurs approximately every 2-7 years.

The Southern Oscillation refers to the atmospheric component of ENSO: the atmospheric pressure and wind patterns respond to the changes in SST in the Pacific. For example, during El Niño the low-level winds, which usually blow from east to west in the equatorial Pacific (trade winds), are significantly weakened, or sometimes even reversed.

ENSO has significant impacts on global weather and climate (section 3). It is a slowly evolving climate phenomenon, the peak of which can be predicted months in advance. Therefore, understanding its global impacts is crucial in providing early advice and warning to regions of the globe likely to be vulnerable those impacts.

2.2 Summary of current forecasts

International Research Institute for Climate and Society (IRI)

All models are predicting El Niño conditions, probabilities are 95% or higher from Jul-Sep 2015 to Jan-Mar 2016.

The IRI forecast is a multi-model forecast which consists of 15 dynamical models and 8 statistical models. All models are predicting El Niño conditions for 2015-16. On average the models are predicting a peak of about 2 degrees warming[1] during a period from Oct-Dec 2015 and to Nov-Jan 2015-16. The average across all 15 dynamical models is slightly

1 In the Niño 3.4 region [5°N-5°S, 120°-170°W]

higher, peaking at 2.2 degrees warming compared with a 1.7 degree peak in the statistical models.

One of the more accurate dynamical models included in the IRI forecast is the ECMWF model. It is predicting a peak of 3 degrees in this region during a period from Oct-Dec 2015 to Nov-Jan 2015-16[2].

European Centre for Medium Range Weather Forecasts (ECMWF)

Strong El Niño peaking in the Eastern Pacific between Nov-Dec 2015 at ~3.5 degrees.

The July forecasts from ECMWF anticipate an El Niño event peaking in the Eastern Pacific (EP)[3] between November and December 2015 with a warming of around 3.5 degrees. A 3.5 degree of warming would make this El Niño event the strongest event on record, surpassing the 1997-98 “El Niño of the century”, which peaked with a 3.2 degree warming. The Central Pacific (CP) will also warm, but forecasts suggest this will be between 1.0 and 2.0 degrees. This is still a large anomaly in the Central Pacific; the previous maximum was 1.2 degrees occurring in November 2009. ECMWF run 51 forecasts every month to sample the uncertainty in the developing conditions. Of the 51 July forecasts, 14 (~30%) show a weaker EP El Niño than 1997-98 (less than 2.7 degrees); a further 20 forecasts (~40%) show an event similar to 1997-98 (2.7-3.7 degrees) and the remaining 17 forecasts (~33%) show an event stronger than 1997-98 (greater than 3.7 degrees).

2 This refers to the seasonal (3 monthly) mean value from the ECMWF model. The following section describes the monthly ensemble of forecasts from the ECMWF model (51 forecasts).

3 In the Niño 3 region [5°N-5°S, 90°-150°W].

SECTION 3

Global Impacts

3.1 Summary of historical global impacts of El Niño

El Niño conditions in the tropical Pacific are known to shift global patterns of rainfall and temperature. The known links with El Niño conditions are summarised below.

June – August

- Wetter than normal in the intermountain regions of the United States and over central Chile.
- Drier than normal conditions over eastern Australia, India and the Sahel and northern South America.
- Warmer than normal conditions along the west coast of South America and across southeastern Brazil.

December – February

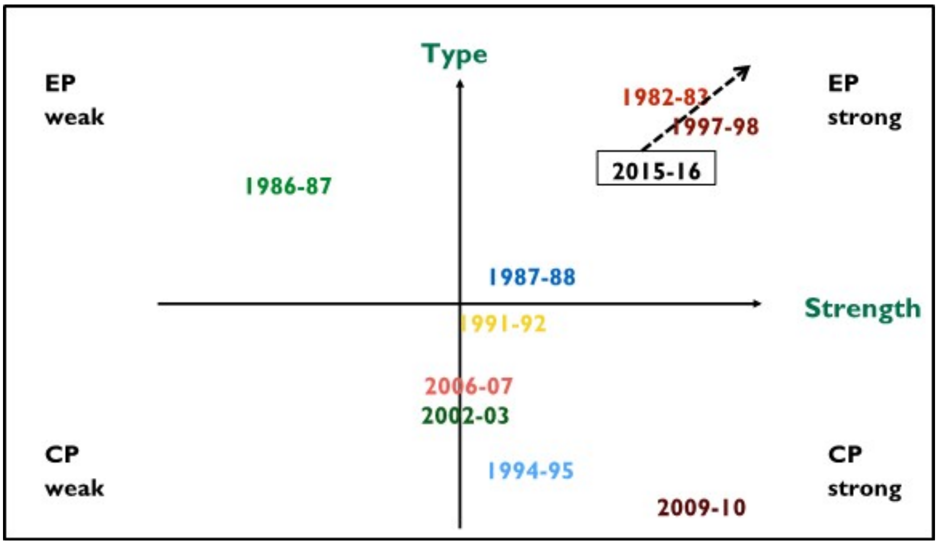
- Increased rainfall in the central and eastern equatorial Pacific.
- Drier than normal conditions over northern Australia, Indonesia, the Philippines, northern South America, Central America and southern Africa.
- Wetter than normal conditions along coastal Ecuador, northwestern Peru, southern Brazil, central Argentina and equatorial eastern Africa.
- Warmer than normal across southeastern Asia, southeastern Africa, Japan, southern Alaska and western/central Canada, southeastern Brazil and southeastern Australia.
- Cooler than normal conditions along the Gulf coast of the United States.

3.2 Scenarios for types of El Niño

The spatial distribution and severity of impacts associated with an El Niño event will depend on the ***type*** *(location of the maximum SST anomaly)* and ***strength*** *(magnitude of the SST anomaly)* of the event. El Niño events can be separated into two types; those with the maximum SST anomaly in the East Pacific (EP; Niño3 region) and those with the maximum SST anomaly in the Central Pacific (CP; Niño4 region[4]). Combined with the separation between weak and strong events, Figure 1 shows a matrix of how the El Niño events over the past 35 years can be characterised. The 2015-16 event is currently forecast to be a strong EP El Niño (as indicated in section 2.2).

[4] Niño 4 region [5°N-5°S, 160°E-150°W].

Figure 1 Matrix of scenarios showing strength (weak to strong; x axis) and type (CP to EP; y axis) classification for previous events. 2015-16 event (black) is already strong in the EP and is forecast to continue to strengthen (black dotted line)



3.3 Global changes in probability of extremes

Figures 2 and 3 show the probability of changes of extremes in temperature, precipitation and soil moisture during the developing (Figure 2; Jun-Feb) and decaying (Figure 3; Mar-Nov) phases of an East Pacific (EP) El Niño event. This analysis is based on 8 observed EP El Niño events over the last 35 years. Extremes here are defined as being in the top (or bottom) 25% of the observed record at that location.

Figure 2 Global change in the probability of extremes in temperature, precipitation and soil moisture during the developing phase of an East Pacific (EP) El Niño event from June-February. Composites are based on 8 EP events over the last 35 years. Colours show the change in the probability of the upper (or lower) quartile during the developing EP event (e.g., light yellow refers to extreme warm temperatures in the upper quartile of the observed record being 1.5-2 times more likely during an EP El Niño). This shows where impacts occur and how important they are to that region

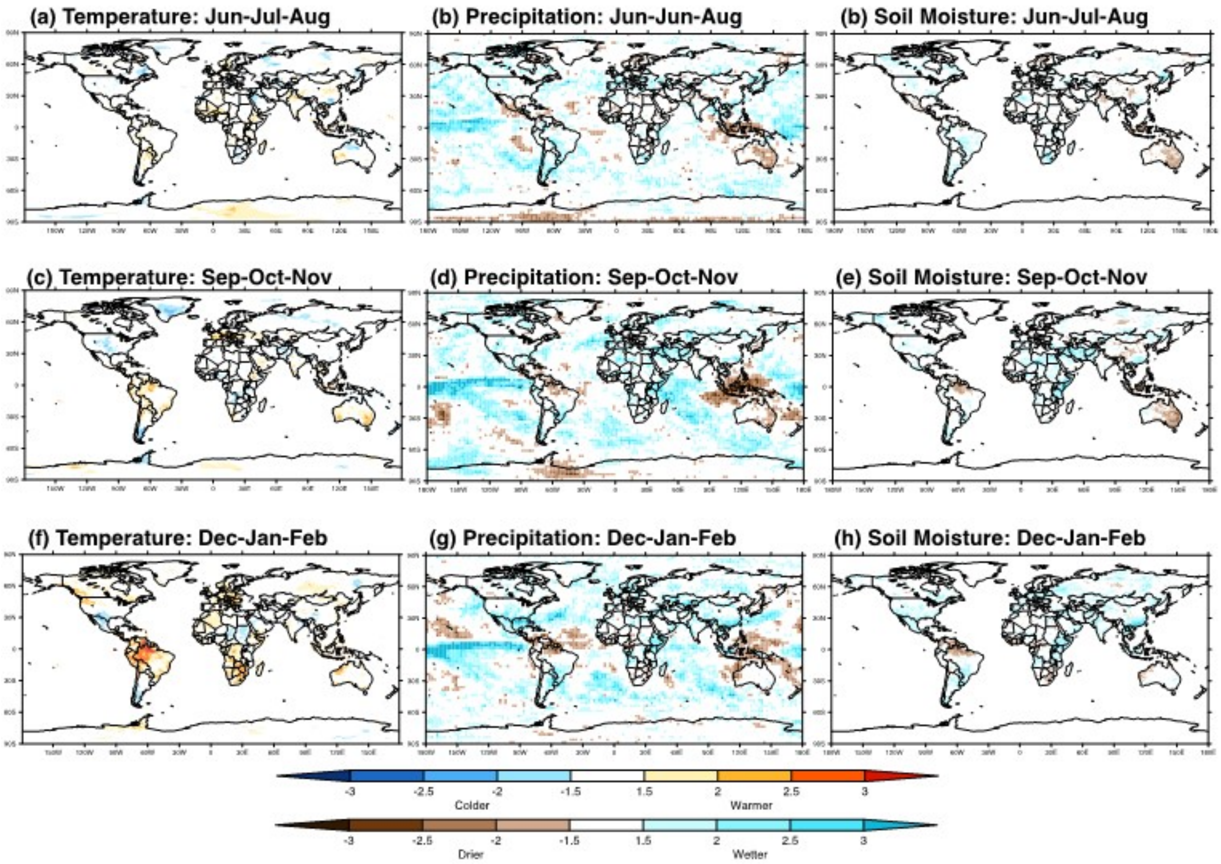
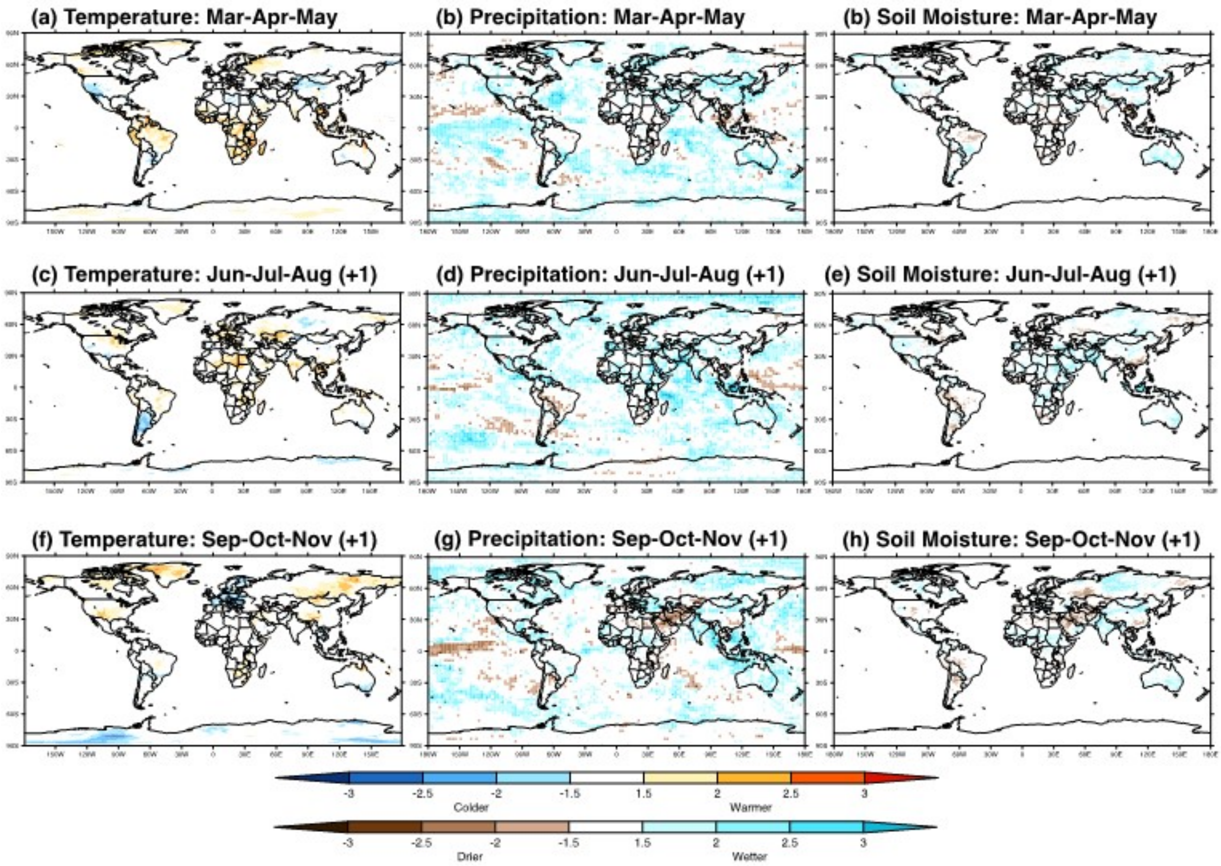


Figure 3 As Figure 2, but for the decaying phase of an East Pacific El Niño from Mar-Nov following the peak. This shows where impacts occur and how important they are to that region



SECTION 4

Impacts by Region and Country

4.1 Introduction

Evidence from past East Pacific (EP) El Niño events has been used to determine the probability of temperature, soil moisture and rainfall extremes during the 2015-16 event in different DFID high priority regions and countries (Table 1) over the next 6 seasons (Annex 1: Table A1.1).

Reference keys for understanding the meteorological and socio-economic impact information are shown in Table 2. These keys can be used to interpret the Impact Tables for each region (Tables 3 – 12).

Table 1 Regions and Countries for Impact Tables

Table	Region	Countries
4.3	Southern Africa	*South Africa, Mozambique, Malawi, Zambia, Zimbabwe*
4.4	West Africa	*Nigeria, Ghana, Sierra Leone*
4.5	East Africa	*Ethiopia, South Sudan, Kenya, Uganda, Somalia, Sudan*
4.6	Central Africa	*Democratic Republic of Congo, Tanzania, Rwanda*
4.7	Middle East and Northern Africa (MENA)	*Libya, Egypt, Algeria, Lebanon, Jordan, Palestinian Territories, Syria, Iraq, Afghanistan*
4.8	Indonesia	*Indonesia*
4.9	Southern Asia	*India, Pakistan, Bangladesh, Nepal*
4.10	Southeast Asian Peninsular	*China, Vietnam, Myanmar (Burma)*
4.11	Caribbean	*Caribbean, Guyana*
4.12	British Overseas Territories	*In following regions: Caribbean, Atlantic, Pacific, Indian Ocean*

4.2 Description of Impact Tables.

For each country or region, the ***likelihood*** of temperature and rainfall[5] extremes occurring over the next 6 seasons is shown by the coloured boxes, according to the Impact Key in Table 2. For example, dark blue colours for temperature – corresponding to “Very Likely Extremely Cold” conditions – can be interpreted as extreme[6] cold conditions in that season, in that country as being at least twice as likely to occur during El Niño. For some large countries, the impact of El Niño is not uniform across the entire country. In these cases, the tables have been annotated to show which area of the country is experiencing the extreme. For example, in SON 2015[7] and DJF 15/16 extreme wet conditions are very likely in south-eastern China, this is represented by ‘SE’ in those boxes in the Impact Table (Table 10). The evidenced impacts are summarised using sector symbols, the uncertainty of the impact in these sectors are represented by the coloured borders around the symbols: red, green and beige correspond to high, medium and potential impacts respectively (see Table 2).

A full description of the methodology and referenced literature is provided in a separate technical report available on request.

5 Rainfall in Impact Tables 4.3 – 4.10 refers to analysis of both Rainfall **and** Soil Moisture.
6 Extreme here refers to an event being in the upper or lower quartile - the bottom or top 25% of the observed record for that country for that season.
7 See Annex 1: Table A1.1 for details of season abbreviations.

Table 2 Impact, Symbol and Level of Confidence Keys

Impact Key

	Very Likely	Likely		Likely	Very Likely
Temperature	Extremely Cold		No consistent signal	Extremely Hot	
Soil Moisture and Rainfall	Extremely Wet			Extremely Dry	

Regional Impacts within each area are denoted by letters:
E.g., **S = South**.
Outside this region there in no consistent signal.

Symbol Key

Analysis of Past El Niño events

Symbol	**Description of threat**
	Crop productivity
	Water availability
	Flooding
	Drought
	Migration /displacement of people
	Infrastructure
	Economy
	Health
	Food Security

Level of Confidence

	High – well evidenced
	Medium – some evidence
	Potential – possible pathway to impact

4.3 Southern Africa

From December 2015 to May 2016, extreme warm temperatures and dry conditions are very likely across southern Africa. In previous events this has resulted in drought and crop failure, particularly reduced Maize yields, which have led to food shortages.

Table 3 Southern Africa

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Southern Africa	Temperature								Reduced water availability, reduction in crop yields. Increased risk of drought-related humanitarian disaster.
	Rainfall								
South Africa	Temperature				E				Increase water stress, reduction in crop yields (e.g., maize and soybean). Below normal instances of Malaria.
	Rainfall			E	NE				
Mozambique	Temperature			S		N	S		Drought, and crop failure leading to potential food shortages.
	Rainfall								
Malawi	Temperature								Drought affecting crop productivity.
	Rainfall								
Zambia	Temperature			S					Increase water stress, crops vulnerable to drought. Increase East Coast Fever in cattle.
	Rainfall		E	E			E		
Zimbabwe	Temperature								Drought leads to significantly reduced maize yield.
	Rainfall								

High Medium Potential

4.4 West Africa

From December 2015 to May 2016, extreme warm temperatures and dry conditions are very likely in West Africa, particularly along the coast. Previously, this has led to drought conditions with reduced crop productivity and the displacement of people. In previous events, drought-forced migration has increased the risk of spreading infectious disease.

Table 4 West Africa

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
West Africa	Temperature								Risk of drought and reduced crop productivity. Drought-related migration leading to increased disease risk.
	Rainfall								
Nigeria	Temperature				S				Drought results in reduced maize yields. Drought-related migration increases risk of spreading infectious disease.
	Rainfall		N		S				
Ghana	Temperature			S					Significantly less rain in May-Jun major rains. Reduced water availability and drought.
	Rainfall	S			S	S			
Sierra Leone	Temperature								Some risk of drought. Reduced rice and maize crop yields.
	Rainfall								

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4.5 East Africa

Extremely wet conditions are very likely in East Africa between September 2015 and February 2016. In previous events this has led to significant flooding causing damage to infrastructure and the displacement of people. Flooding leads to an increase risk of Rift Valley Fever epidemics and Malaria and Cholera outbreaks.

Table 5 East Africa

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
East Africa	Temperature								Risk of flooding causing damage to infrastructure and displacement of people. Increased risk of Rift Valley Fever, Malaria, and Cholera.
	Rainfall								
Ethiopia	Temperature								Risk of flooding causing displacement of people. Increase incidence of Rift Valley Fever, Malaria and Cholera.
	Rainfall		E				W		
South Sudan	Temperature			SE	SE				Flooding affecting infrastructure and access to basic relief for vulnerable people.
	Rainfall			SE					
Kenya	Temperature								Flooding affecting access to food. Increase risk of Rift Valley Fever, Malaria and diarrhea.
	Rainfall								
Uganda	Temperature								Significant displacement of people following flooding and landslides. Increase risk of Cholera and highland Malaria.
	Rainfall								
Somalia	Temperature			N		E	NE		Continuous heavy rains causing river bank collapse and flooding. Increase risk of Rift Valley Fever.
	Rainfall		S	N					
Sudan	Temperature					NW			Flooding and mudslides cause displacement of people and affects access to food.
	Rainfall					NE	S		

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4.6 Central Africa

Extremely wet conditions are likely in central Africa from September 2015 to February 2016 during the developing phase of El Niño. In previous events this has caused flooding with damage to infrastructure and increased risk of Rift Valley Fever epidemics. Extremely warm conditions are likely in the decaying phase from March to May 2016. In previous events this has led to reduced water availability and crop production.

Table 6 Central Africa

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Central Africa	Temperature								Flooding during developing phase. Increased Rift Valley Fever risk. Reduced crop productivity during hot temperatures in decaying phase.
	Rainfall								
Democratic Republic of Congo	Temperature		S						
	Rainfall	SE				S	N		
Tanzania	Temperature		NW			E			Flooding during El Niño peak. Warm temperatures during Mar-May lead to decreased crop productivity. Increase Rift Valley Fever risk.
	Rainfall						SE		
Rwanda	Temperature								Flooding destroys homes and schools and leads to large numbers being displaced. Increased incidents of highland Malaria.
	Rainfall								

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4.7 Middle East and Northern Africa (MENA)

Extremely wet conditions are very likely across the MENA countries, especially during September to November 2015 in the developing phase and from Jun to August 2016 in the decaying phase of El Niño. In previous events this has caused flooding with significant damage to infrastructure. Extremely dry conditions are very likely from September to November 2016 following the peak of El Niño. There is potential for drought and reduced water availability and crop productivity during this period.

Table 7 Middle East and Northern Africa (MENA)

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
MENA	Temperature								Potential for flooding before El Niño peak. Potential for drought following peak, resulting in reduced crop productivity.
	Rainfall								
Libya	Temperature					W			
	Rainfall						N		
Egypt	Temperature					SW			Agricultural land and houses flooded during El Niño peak. Reduction in maize and wheat crop yields.
	Rainfall			N	N	E	N		
Algeria	Temperature					S			Affected by reduced crop productivity and drought.
	Rainfall	W	E						
Lebanon	Temperature								Flooding and high winds during El Niño peak destroys infrastructure and disrupts power.
	Rainfall								
Jordan	Temperature	E							Flash flooding experienced before El Niño peak.
	Rainfall								
Palestinian Territories	Temperature								
	Rainfall								
Syria	Temperature	S							Heavy rain causing flooding prior to peak. Drought following El Niño, reduced water availability.
	Rainfall				W				
Iraq	Temperature	W							Flooding destroys infrastructure and causes displacement of people.
	Rainfall			NW			S		
Afghanistan	Temperature								Potential for flooding during developing phase of El Niño causing damage to crops, livestock and homes.
	Rainfall			N	N		N		

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4.8 Indonesia

Extremely warm and dry conditions are very likely in Indonesia during the developing phase of El Niño from August to November. In previous events this has caused significant drought, which has led to reduced crop production and increased threat of significant forest fires. Extremely wet conditions are very likely following the peak, especially from June to August 2016. Previously this has caused flooding and landslides and led to increased risk of Dengue Fever.

Table 8 Indonesia

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Indonesia	Temperature		S					Developing Decaying	Drought during developing phase, reduction in water availability, crop production, threat of forest fires with health-related risk. Flooding and landslides following peak with risk of increased Dengue Fever.
	Rainfall								

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4.9 Southern Asia

Extreme warm and dry conditions are likely across Southern Asia during the developing phase of El Niño. In previous events this has resulted in below normal monsoon rainfall in the region, leading to drought and reduced crop productivity. Extreme wet conditions are likely following the El Niño peak. Previously, this has led to an increase in Cholera and Malaria outbreaks in the region.

Table 9 Southern Asia

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Southern Asia	Temperature							Developing Decaying	Below normal monsoon rainfall, drought risk and reduced crop productivity during developing phase. Potential for flooding following peak with increased Cholera and Malaria risk.
	Rainfall								
India	Temperature	N	S			W			Slow onset of monsoon in developing phase, drought risk and reduced soybean crops. Increased water availability and reduced rice crop failure in south.
	Rainfall	N				S			
Pakistan	Temperature								Affected by drought in North. Increased risk of Malaria epidemics after El Niño peak.
	Rainfall	N					NE		
Bangladesh	Temperature								Drought risk in developing phase. Increase Cholera risk after peak.
	Rainfall								
Nepal	Temperature								
	Rainfall								

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4.10 Southeast Asian Peninsular

Extreme warm and dry conditions are very likely across the Southeast Asian Peninsular during March to May 2016 following the peak of El Niño. In previous years, this has resulted in drought and forest fires and reduced crop productivity.

Table 10 Southeast Asian Peninsular

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Southeast Asian Peninsular	Temperature								Increased risk of drought and forest fires. Reduced crop productivity.
	Rainfall								
China	Temperature	SE			NW				Flooding resulting in displacement of people. Reduction in maize crop productivity. Increase risk of dysentery in east.
	Rainfall		SE	SE	N	SE	N		
Vietnam	Temperature					N			Increase incidences of forest fire and smoke-related deaths.
	Rainfall			N		N			
Myanmar (Burma)	Temperature								Affected by moderate drought and reduction in maize and rice crops. Increase risk of Cholera and Malaria.
	Rainfall				S		NW		

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4.11 Caribbean

During the developing phase and peak of El Niño, from September 2015 to May 2016, the Eastern Caribbean – Haiti, Dominican Republic, Puerto Rico, US Virgin Islands, St. Maarten, and Barbados – is very likely to be extremely warm and likely to be dry. In previous events this has resulted in drought.

Following the peak of El Niño, from June 2016 to November 2016, the North Western Caribbean – Cuba, Bahamas and Jamaica – is likely to be extremely wet. This has caused flooding in previous events and can increase the risk of Dengue Fever.

Hurricane Season

The Caribbean hurricane season runs from June – November. El Niño is known to suppress hurricane activity in the Atlantic Basin. Over the Caribbean this will likely result in fewer hurricanes making landfall across northern Caribbean (e.g., Cuba, Bahamas, Jamaica) during the 2015 hurricane season. A significantly higher number of hurricanes are known to make landfall over the Caribbean during La Niña conditions. This will be of interest if this El Niño transitions into strong La Niña conditions because then the next hurricane season (June 2016 – November 2016) could be more active.

Table 11 Caribbean

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Caribbean	Temperature		E	E	E			Developing	Risk of drought and reduced water availability during developing phase. Potential for flooding following peak. Increase risk of Dengue Fever.
	Rainfall			E		NW	NW	Decaying	
Guyana	Temperature			S					Increased drought risk during developing phase. Reduction in maize and rice crops. Potential increase in Malaria.
	Rainfall				N				

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4.12 British Overseas Territories

***Caribbean** – [Anguilla, Montserrat, British Virgin Islands, – **East**], [Cayman Islands, Turks and Caicos Islands – **North**].*

See section 4.11 and Table 11 for details of impacts over the Caribbean.

***Atlantic** – [Bermuda – northern subtropical], [St Helena and dependencies- Ascension Island, Tristan da Cunha – southern tropical], [Falkland Islands, South Georgia and the South Sandwich Islands, British Antarctic Territories – South]*

Northern Subtropical Atlantic (Bermuda)

The Atlantic hurricane season in general is forecast to be below normal in 2015. However, in the northern subtropical Atlantic, north of the main development region in the Caribbean, conditions are forecast to favour higher than average hurricane activity during August – October 2015.

South Atlantic (Falkland Islands, South Georgia and the South Sandwich Islands, British Antarctic Territories)

During the developing phase of El Niño from September to November the Antarctic Peninsula and Islands to the north are likely to be colder than normal. During the peak of El Niño the Antarctic Peninsula is likely to be warmer than normal. There is some indication that the British Antarctic Territories are likely to be drier, especially during the developing phase of El Niño from September to November. However, there is low confidence in the potential impacts of El Niño this far away from the tropics.

Southern Tropical Atlantic (St Helena and dependencies- Ascension Island, Tristan da Cunha)

There is no coherence in the impacts of El Niño across the tropical Atlantic south of the equator. The subtropical Atlantic is likely to be wetter than normal from September 2015-February 2016; however, this is south of St Helena and dependencies.

Table 12 British Overseas Territories

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
northern subtropical Atlantic	Temperature								Increase hurricane activity (north of the normal development region in Caribbean). Potential increase Dengue Fever.
	Rainfall								
southern South Atlantic	Temperature			S					Potential for Island flooding during peak. Potential for large temperature departures from the mean.
	Rainfall		S	N					

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Pacific *– [Pitcairn Islands]*

The equatorial Central and East Pacific will experience warm and wet conditions during the peak of El Niño. Dry extremes are likely to occur across the Maritime Continent and in the tropical, off-equatorial West Pacific during the peak. The Pitcairn Islands lie in the South Pacific Convergence Zone (SPCZ), which is likely to be wetter than normal during September 2015 – February 2016. This could increase the risk of flooding with potential damage to infrastructure.

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Central Pacific	Temperature								Increase risk of flooding during the peak for Islands in the South Pacific Convergence.
	Rainfall								

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Indian Ocean – [British Indian Ocean Territory]

Extremely wet conditions are very likely in the central Indian Ocean during September to November 2015 of the developing phase. Wet conditions are also likely during the decaying phase from March to August 2016. This could potentially lead to flooding and damaged infrastructure on islands in the central Indian Ocean.

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Central Indian Ocean	Temperature								
	Rainfall								

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Southern Europe – [Gibraltar]

During the developing phase of El Niño, from June – November, southern Europe is likely to be wet. During the summer of the decaying phase, from June to August 2016, it is also likely to be wet across southern Europe. However, there is low confidence in these impacts as there is significant variability from one el Niño event to another. This could impact crop productivity in the region.

Country	Variable	JJA 2015	SON 2015	DJF 15/16	MAM 2016	JJA 2016	SON 2016	Risk	Evidenced Impacts
Southern Europe	Temperature								
	Rainfall								

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Annex 1 Supplementary Material

This is a summary report of the impact analysis that has been carried out. Further detail of the methodology and evidence - in the form of extended tables, maps and references - for the impacts form part of the extended slide deck.

Table A1.1 Season abbreviations used in Impact Tables

Season	Months
JJA 2015	*Jun 2015 - Jul 2015 - Aug 2015*
SON 2015	*Sep 2015 - Oct 2015 - Nov 2015*
DJF 15/16	*Dec 2015 - Jan 2016 - Feb 2016*
MAM 2016	*Mar 2016 - Apr 2016 - May 2016*
JJA 2016	*Jun 2016 - Jul 2016 - Aug 2016*
SON 2016	*Sep 2016 - Oct 2016 - Nov 2016*