Food and Agriculture Organization of the United Nations

La Niña

Early warning – early action analysis for a potential La Niña in 2016 – 2017

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> ### What is La Niña?
>
> La Niña is the cooling of sea surface temperatures in the tropical Pacific, which occurs roughly every three to five years, lasting from six to 24 months. The chances of La Niña following an El Niño episode are higher on average — half of the El Niño events are followed by a La Niña — and typically it affects global climate patterns in the opposite way El Niño does. The intensity of the La Niña climatic phenomenon generally peaks between October and January.

Purpose of this report

The aim of this report is to consolidate information on La Niña's potential impacts on agriculture and food security, specifically in the regions which are now dealing with the consequences of EL Niño, and to provide early action recommendations in the agriculture sector to either reap the beneficial outcomes of La Niña, or prevent, mitigate and prepare for its negative effects.

What is the current forecast for La Niña?

Current forecasts indicate that there is a 55 to 70 percent chance of a La Niña episode developing towards the end of 2016, with a slightly lower chance that the onset may occur as early as July. The timing of a La Niña onset is key to determine how its consequences will impact on agriculture.

What are the main consequences of La Niña for agriculture and food security?

A La Niña phenomena generally affects the same regions that are impacted by El Niño, with opposite climatic consequences. Areas which experienced dry conditions (below-average rainfall and/or increased temperature) during El Niño, for instance, tend to receive above-average rainfall and in some cases cooler temperatures.

While the climatic phenomenon usually peaks in intensity between October and January, changes to climatic patterns and their related impacts on food security and agriculture can happen both before and after the peak. It's possible that La Niña could develop as early as July, in which case it might already start affecting the growing seasons in some parts of the world from September 2016.

Consequences of La Niña on agriculture and food security can be both positive and negative. The positive effects derive from the increased likelihood of above average rainfall which could improve pasture and crop yields. At the same time, if the above-average rainfall results in flooding, then clearly the results may be negative as in this case there is an increased incidence of seeds being washed away, landslides, crops destroyed and livestock morbidity and mortality. Since La Niña would most likely impact regions that have already been affected by El Niño, the food security situation could further deteriorate and protract into 2018. In the event of a "positive" La Niña, it is important to highlight that the actual full effect of a above average rainfall will not be felt until the next harvest — i.e. the end of 2016 (if La Niña comes early) or by mid-2017 (if La Niña occurs later).

Historical La Niña trends

The Institute for Climate and Society at Colombia University has developed a typology of La Niña climatic impacts based on analysis of La Niña events over the years. The following map indicates the typical impacts of La Niña on the continent.
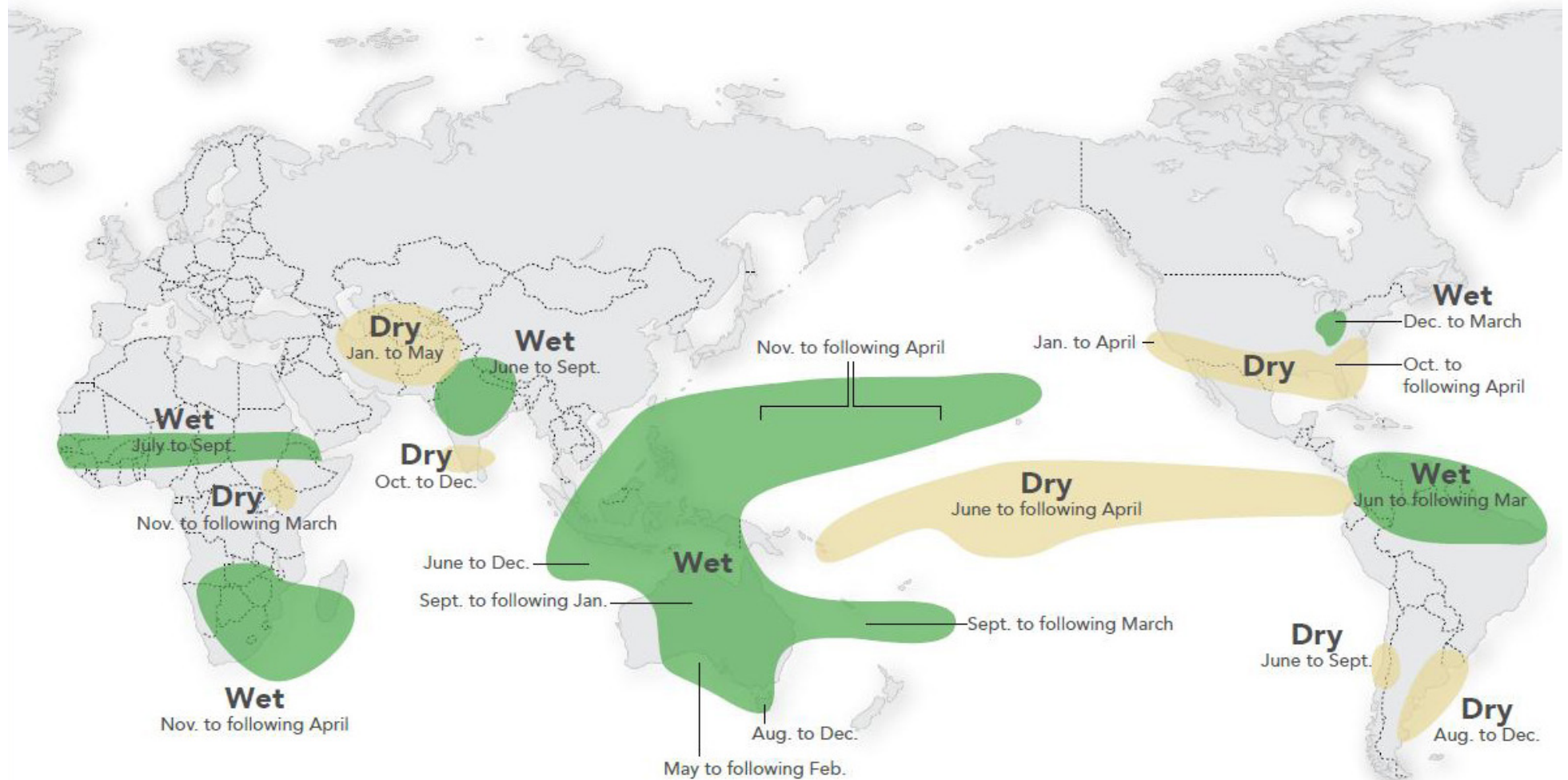
For more information on El Niño and La Niña, go to: http://iri.columbia.edu/enso
Sources:
1. Ropelewski, C. F. and M. S. Halpert, 1989: Precipitation patterns associated with the high index phase of the Southern Oscillation. J. Climate., 2, 268-284,
2. Mason and Goddard, 2001. Probabilistic precipitation anomalies associated with ENSO. Bull. Am. Meteorol. Soc. 82, 619-638

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Timeline of impact graph

The following diagram[1] illustrates a potential timeline of La Niña-induced impacts across different regions based on the usual pattern observed during La Niña years. It can help guide the appropriate timing for early action implementation. This consolidated information is subject to change as forecasts evolve and additional information becomes available.

Timeline of potential La Niña impacts across the globe										
	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
La Niña probability forecast									
Continents and regions									
AFRICA: Southern Africa					Above-average rainfall				
AFRICA: East Africa					Drier-than-average conditions				
AFRICA: The Sahel *(only in case of early onset)*			🏠						
AMERICA: Central America, Caribbean and northern South America			Above-average rainfall and increase in cyclones						
AMERICA: South America *(southern Brazil and central Argentina)*			Drier-than-average conditions						
ASIA: South and Southeast Asia *(Indonesia, Malaysia, Philippines, Papua New Guinea)*			Above-average rainfall						
ASIA: Central Asia								Drier-than-average conditions	

[1]The graph focuses only on the general patterns of impact on specific regions which are further detailed below. The row on La Niña probability forecast is based on the official CPC-IRI consensus-based forecast. The dark blue indicates the level over 70 percent in the forecast for La Niña probability, not its strength. The graph stops at March 2017 as does the official forecast information, yet consequences of La Niña on agricultural seasons might endure further.
It should be noted that the list of regions affected is not extenive and that early effects of La Niña are marked starting from September 2016, even though historically La Niña consequences could start earlier. This is due to the current status of the forecast and the potential timing of La Niña consequences, explained in the page above.

Impact outlook

Increased flood and cyclone risk

- In Southern Africa, La Niña is generally associated with increased probability of above-average rainfall from around November to April, which corresponds to the main cropping season for most countries in the region.

Potential benefits

- Enhanced rainfall could speed up the regeneration of pasture land and lead to above-average crop production for the summer harvest.
- Positive effects of La Niña on crop production would only be able to alleviate the current high levels of food insecurity from February 2017 onwards, when the main maize crop matures and is subsequently harvested.

Potential negative effects

- If excessive, precipitation would increase the risk of localized flooding which could wash away seeds, damage or destroy standing crops, increase livestock morbidity and mortality and damage infrastructure.
- There is also an increased likelihood of cyclones forming in the Mozambique channel with associated potential landfall and flooding.

Recommended early actions

Farmers and pastoralists in the region need to be supported in order to be able to reap the potential benefits of La Niña. This should be done through a set of indicative early actions as indicated below.

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16
				Rainy season		
				Planting		
Support recovery of smallholder farmers		Fertilizer and seed support CASH+				
Protect and enhance livestock production	Vaccination			Livestock restocking		

Conversely, in order to prepare for the negative consequences of localized flooding, the following should be embedded into current response plans.

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16
				Rainy season		
				Planting		
Flood/flash flood preparedness to protect livelihoods	Check dam construction / Repair/support riverbanks / Community seed stores / Short-cycle crop varieties for post floods					

Impact outlook

East Africa: increased likelihood of above- and below-average rainfall

- Localized areas of East Africa are mostly affected by drier-than-normal conditions during La Niña events, particularly from November to March. This would particularly occur in regions of Ethiopia, South Sudan, Somalia and Kenya.
- Localized flooding can also occur in East Africa, such as northern Ethiopia, central and northern Sudan.

Potential benefits
- Above-average rainfall could bring relief to areas impacted by drought and enhance restoration of pasture and crop production.

Potential negative effects: below-average rainfall
- Below-average rainfall or drought induced by La Niña in the latter half of this year would negatively affect the secondary agricultural season, crop harvested in February-March.
- Dry conditions could worsen body conditions and trigger increased livestock migration, expanding the spread of livestock diseases.

Potential negative effects: above-average rainfall
- In some areas, above-average rainfall could increase the risk of localized flooding with associated damage to crops, livestock and infrastructure.

Sahel: increased likelihood of above-average rainfall

Potential benefits
- An early onset of La Niña would potentially benefit the end of the crop season for the Sahel region, since the phenomenon brings above-average rainfall from July to September.

Potential negative effects
- Risk of localized flooding and its associated crop damage, livestock loss and displacement would also increase.
- Risk of increased Desert Locust infestations due to improved ecological conditions in the summer breeding areas of northern Sahel (July—October).

Early actions relevant for above-average rainfall conditions include:

- map out areas vulnerable to flooding and communicate land use risks;
- advise pastoralist herders about the risk of flooding in migratory routes (Pastoralist Knowledge Hub could be used);
- check dam construction;
- repair/support riverbanks; and
- support construction of community seed stores.

Early actions relevant for drier-than-average conditions include:

- regular vaccination programs conducted before November/December, to prevent negative impacts (vaccinating drought-weakened animals);
- supplementary feeding for livestock to preserve livelihoods of highly vulnerable pastoralists;
- tracking and follow-up of situation of migratory routes and advice to pastoralists;
- support water supply for livestock and crops through rehabilitating or establishing new/temporary water points; and
- commercial destocking.

AMERICA: Central, South America and the Caribbean regions

Impact outlook

Central America, the Caribbean and northern South America

- La Niña in these areas is associated with localized above-average precipitation from June to March of the following year.

Potential benefits

- An early onset of La Niña might benefit the *primera* season cereal crops currently being planted in areas of the Dry Corridor of Central America. In northern Brazil, La Niña might benefit planting and early development of food crops.

Potential negative effects

- La Niña can have two main negative effects for the region:
  - Bean production might be affected, if La Niña establishes itself in September when the harvest occurs. The *primera* season is not the main bean production season, but it is the season from which farmers obtain seeds for the following main *postrera* season (December to March). Excessive rainfall might impact the quality of seeds and result in important seed losses, given the sensitivity of beans to humidity.
  - The Atlantic hurricane season (June November) increases in activity during the La Niña phenomenon. For instance, the extensive damage inflicted in 1998 by Hurricane *"Mitch"* to Central America and the Caribbean occurred during a La Niña year.

Southern America

- In several other parts of South America, an early onset of La Niña would bring drier-than-normal weather along coastal Ecuador, northwestern Peru, southern Brazil, Uruguay, Argentina and central Chile.

Potential negative effects

- Dry conditions could affect wheat and soya crops in southern Brazil and central Argentina, which are also the main producing areas.
- Lack of pasture will affect animal body conditions and general health making them more susceptible to different diseases, as well as reduce production such as milk and wool.
- Low grass will force animals to graze close to soil and hence in anthrax endemic areas increase the risk of infection.

Early actions relevant for above-average rainfall in Central America, the Caribbean and northern South America include:

- act now to ensure harvest monitoring surveillance is sufficient to allow timely response to damaged *primera* harvest in August/September;
- response could include seed support in order to ensure adequate planting for the main *postera* season;
- immediate agricultural extension advice to be issued to farmers on seed drying methods and storage before the bean "primera" harvest in August/September;
- immediate review of flood defence capacities in flood-prone areas — check dam construction, repair/support riverbanks and support to construction of community seed stores as appropriate; and
- support agricultural extension services to prepare advice on adjustments of fertilizer and fungicide application or early harvest. (Actual applicability and timing will depend on meteorological forecasts, precipitation rates and crop and plant growth stage).

Early actions relevant for drier-than-average conditions in South America include:

- immediate preparation for extension advice on planting of early maturing soybeans in September/October; and
- support water supply for livestock and crops through immediate review of water point coverage and rehabilitation or establishment as appropriate in July/August.

Impact outlook

South and Southeast Asia

- In much of South and Southeast Asia, La Niña increases the probability of heavier rainfall, especially during the end of 2016 and start of 2017. This is particularly the case for Indonesia, Bangladesh and Malaysia, and these effects could extend to the Philippines, Papua New Guinea, areas of the Pacific and other countries in the region.

Potential benefits
- If La Niña sets-in early (from July onwards), enhanced rainfall could benefit crop development of the 2016 main season crops in the Northern Hemisphere countries and the 2016 secondary crops in the Southern Hemisphere, bringing relief to current drought-affected areas.

Potential negative effects
- Excessive rains could increase the risk of flooding for low-lying agricultural lands, produce extensive damage to standing crops, increase pest and diseases and heighten the potential for landslides.

Central Asia

- Across various countries in Central Asia, La Niña would bring drier-than-average conditions from January to May 2017.

Pacific

- Consequences would vary widely across the Pacific. One of the main potential benefits would be the reduced likelihood of hurricanes in the northeast Pacific.

Early actions relevant for above-average rainfall in South and Southeast Asia include:

- advise farmers on seed drying methods and storage;
- check dam construction in high flood-prone areas, repair and support riverbanks and establish community seed stores in July/August;
- support agricultural extension services to preapre advice on adjustments of fertilizer and fungicide application or early harvest. (Actual applicability and timing will depend on meteorological forecasts, precipitation rates and crop and plant growth stage);
- provide submergence-tolerant rice varieties based on meteorological forecasts (for first, second or third rice crop respectively to countries affected); and
- intensify surveillance and monitoring of vector-borne diseases from September onwards.

Early actions relevant for drier-than-average conditions in Central Asia include:

- provide abiotic stress-tolerant varieties for early crops and early maturing crops (e.g. potato) in January for the planting season in February/March (depending on location and farming systems); and
- strengthen community-based water management techniques from October to December.

Sources of information

This analysis consolidates information produced mostly by these sources and references:

- Global Information and Early Warning System on Food and Agriculture (GIEWS) of the Food and Agriculture Organization of the United Nations

- International Research Institute for Climate and Society (IRI), Earth Institute, Columbia University

- National Oceanic and Atmospheric Administration (NOAA), Climate Prediction Centre

- Hirons L. and Klingaman N.; La Niña 2016/2017 Historical Impact Analysis, Report produced for Evidence on Demand with the assistance of the UK Department for International Development, February 2016.

- Inter-Agency Standing Committee, Early Warning, Early Action and Readiness Report, June – November 2016

- Office for the Coordination of Humanitarian Affairs (OCHA), Overview of Impact, Projected Humanitarian Needs and Response, June 2016

- Famine Early Warning Systems Network (FEWSNET)

- The Desert Locust Information Service (DLIS), AGPMM, FAO HQ