UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

El Niño :
A Risk Assessment Approach for Resilient Development Planning

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Regional Capacity Development Workshop:

Mainstreaming Disaster Risk Reduction in Sustainable Development Planning

13-16 September, 2016

ESCAP SSWA-SRO

New Delhi, India

El Niño in Asia-Pacific: Introduction & Context

El Niño: Climate phenomenon – slow-onset disaster – occurs when a vast pool of water in Central/Eastern tropical Pacific Ocean becomes abnormally warm.

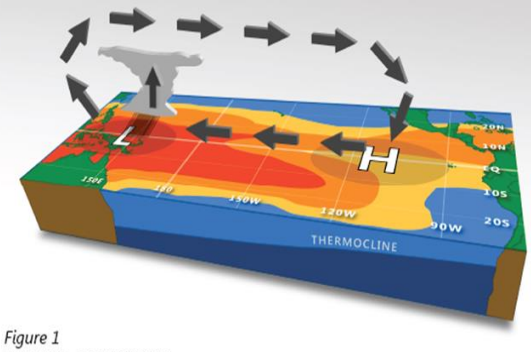


Figure 1
NEUTRAL CONDITIONS

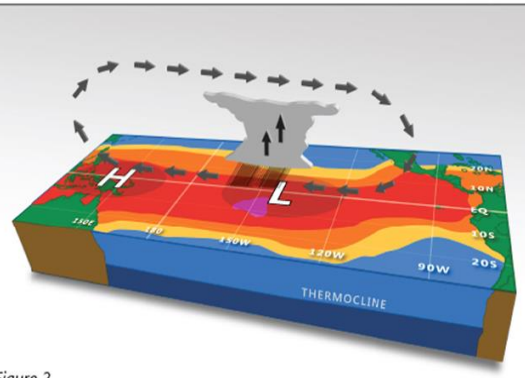
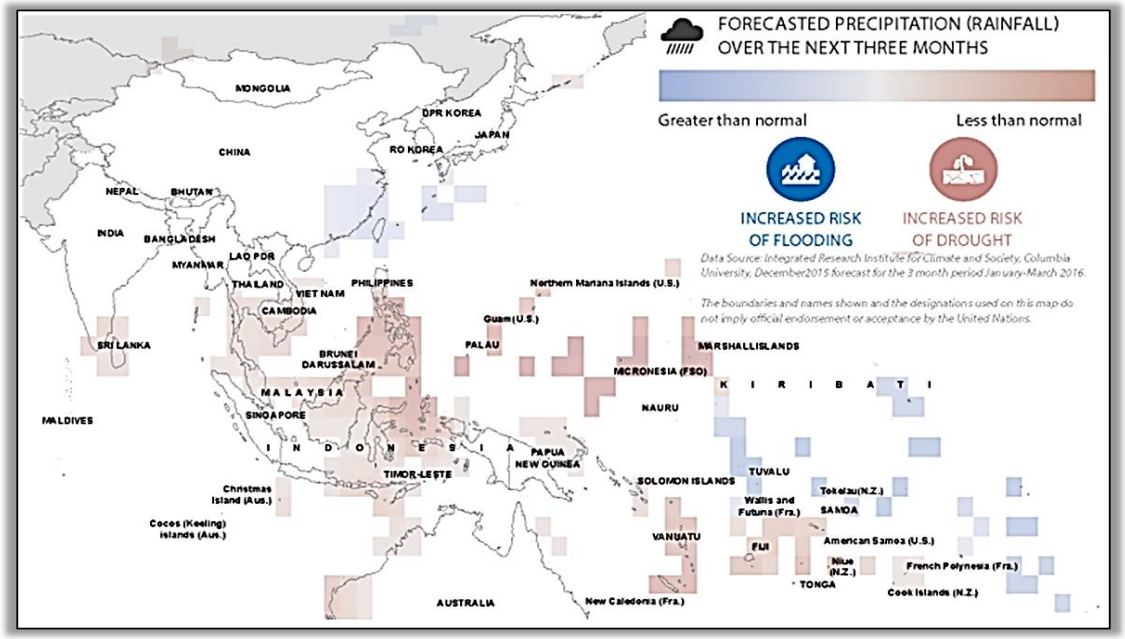


Figure 2
EL NIÑO CONDITIONS

Impacts: 2015-16 El Niño is strongest on record since 1997-8 event. Associated with **irregular rainfall** & **extreme weather**.

- **60** million affected globally by extreme weather events.
- **Economic cost** of 1997-8 event an estimated **US $ 45 billion**.



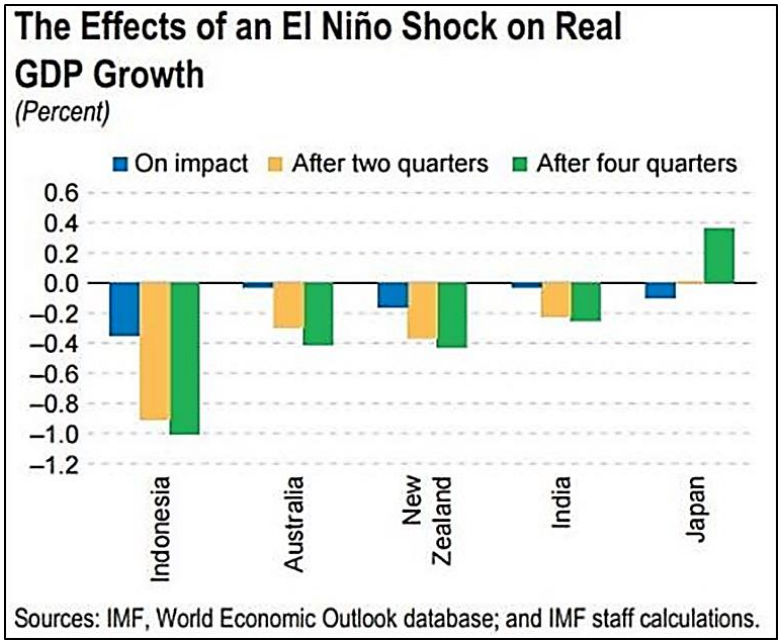
Challenge for achieving sustainable development: Slow-onset hazards gradually erode development gains. ***Critical gaps remain in assessing impacts such hazards, such as El Niño, across multiple sectors -> Need for a composite methodology.***

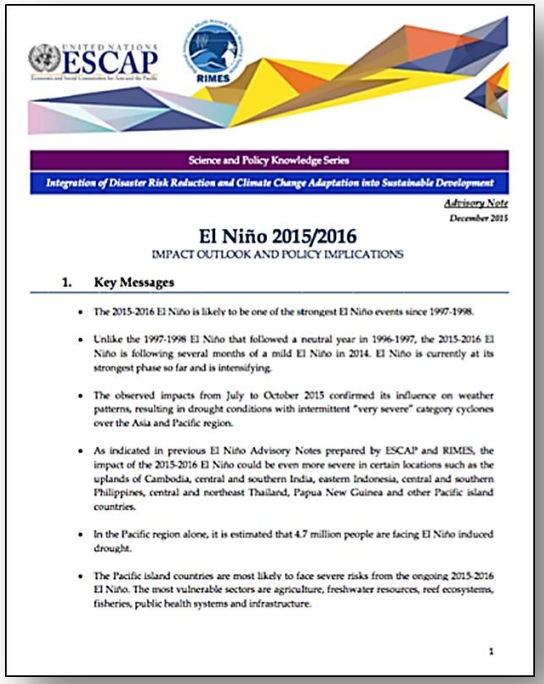
El Niño in Asia-Pacific: Impacts & Link to Development Planning

El Niño impacts: Differ across Asia-Pacific, but generally experienced as extended dry spells or drought.

Sectors affected: Agriculture, Fisheries, Infrastructure, Public Health and Ecosystems.

Macro-economic effect: El Niño shocks impact the economy even after 4 quarters of the shock; particularly agrarian economies.




UNITED NATIONS ESCAP

RIMES

Science and Policy Knowledge Series

Integration of Disaster Risk Reduction and Climate Change Adaptation into Sustainable Development

Advisory Note

December 2015

El Niño 2015/2016

IMPACT OUTLOOK AND POLICY IMPLICATIONS

1. **Key Messages**

- The 2015-2016 El Niño is likely to be one of the strongest El Niño events since 1997-1998.
- Unlike the 1997-1998 El Niño that followed a neutral year in 1996-1997, the 2015-2016 El Niño is following several months of a mild El Niño in 2014. El Niño is currently at its strongest phase so far and is intensifying.
- The observed impacts from July to October 2015 confirmed its influence on weather patterns, resulting in drought conditions with intermittent "very severe" category cyclones over the Asia and Pacific region.
- As indicated in previous El Niño Advisory Notes prepared by ESCAP and RIMES, the impact of the 2015-2016 El Niño could be even more severe in certain locations such as the uplands of Cambodia, central and southern India, eastern Indonesia, central and southern Philippines, central and northeast Thailand, Papua New Guinea and other Pacific island countries.
- In the Pacific region alone, it is estimated that 4.7 million people are facing El Niño induced drought.
- The Pacific island countries are most likely to face severe risks from the ongoing 2015-2016 El Niño. The most vulnerable sectors are agriculture, freshwater resources, reef ecosystems, fisheries, public health systems and infrastructure.

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UNESCAP & RIMES released 2015-2016 El Niño impact outlook advisories for Asia-Pacific documenting past El Niño risk patterns & policy recommendations.

Assessing El Niño Risk: A Step-wise Approach

1. Review of existing global El Niño forecasts
2. El Niño Characterization
3. Assessment of changes in probability of extremes in Asia-Pacific region
4. Assessment of Likelihood of Extreme Events in Respect of Seasons and Regions within the Country
5. Assessment of biophysical impacts
6. Assessment of socioeconomic impacts
7. Assessment of likelihood of extended impacts vis-a-vis livelihood recovery
8. Communicating risks

Source: ESCAP, UNDP & RIMES, 2016.

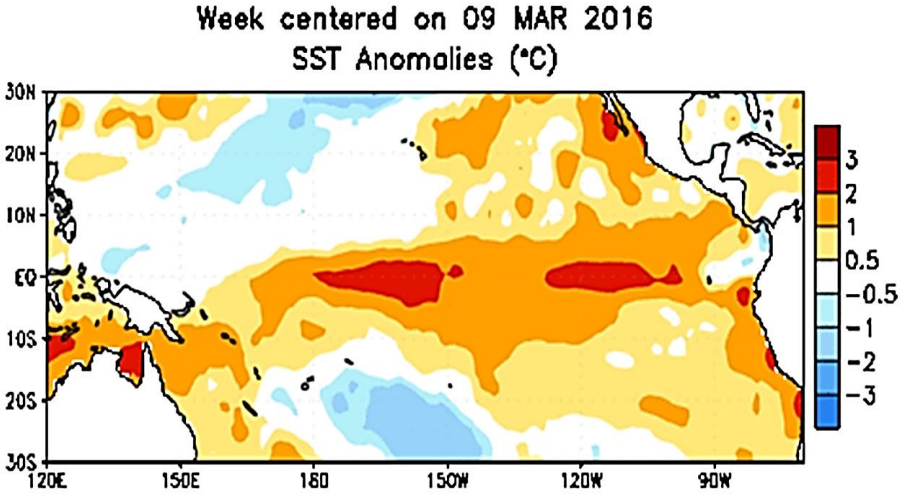
Step 1 & 2: REVIEW OF EXISTING GLOBAL FORECASTS & EL NINO CHARACTERIZATION

Step 1: Review of existing forecasts

Various ENSO forecast products provided at different intervals by global & regional centres; eg: NOAA, WMO etc.

Step 2: El Niño characterization

Each episode is ***unique***; can be typified based on magnitude, onset, duration, & other key factors.

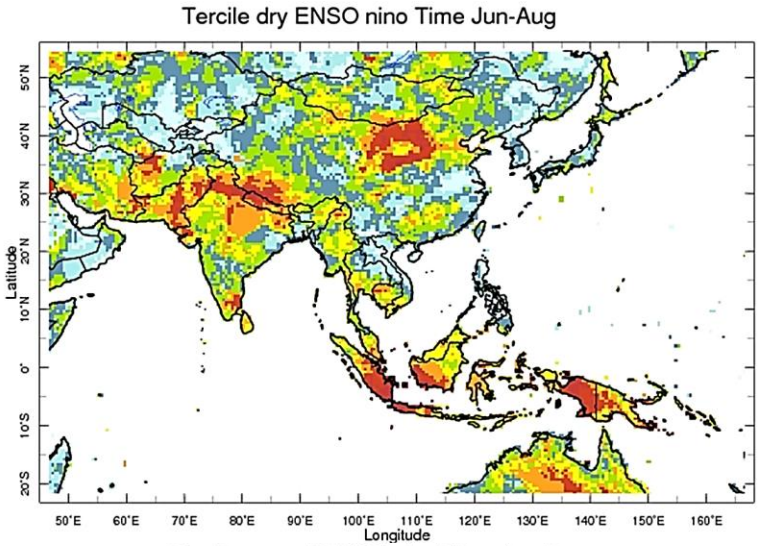


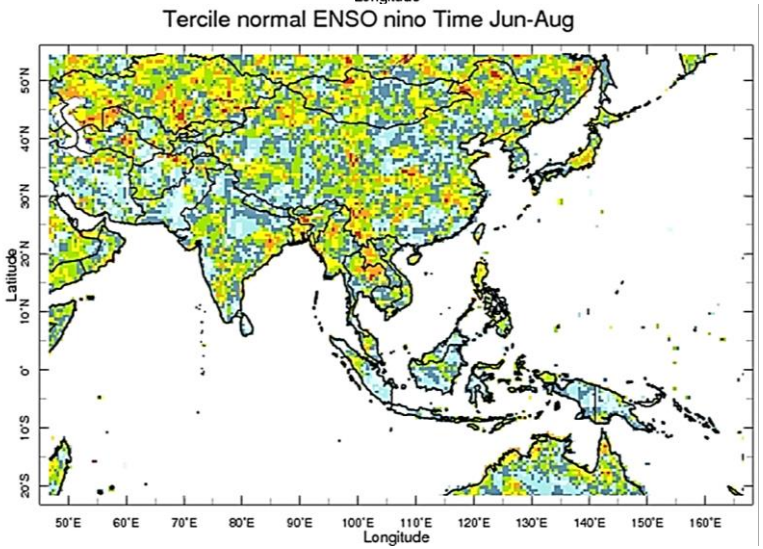
The Sea Surface Temperature Anomalies over the Pacific are monitored through image.

Year	Magnitude	Onset	End	Duration
1982-83	Strong	May 1982	Jun 1983	14
1986-88	Moderate	Sep 1986	Feb 1988	18
1991-92	Moderate	May 1991	May 1992	13
1994-95	Weak	Aug 1994	Feb 1995	7
1997-98	Strong	May 1997	May 1998	13
2002-03	Moderate	Jun 2002	Mar 2003	10
2004-05	Weak	Aug 2004	Jan 2005	6
2006-07	Weak	Sep 2006	Jan 2007	5
2009-10	Moderate	Jul 2009	Apr 2010	10
2014-16	Strong	Nov 2014	Ongoing	16

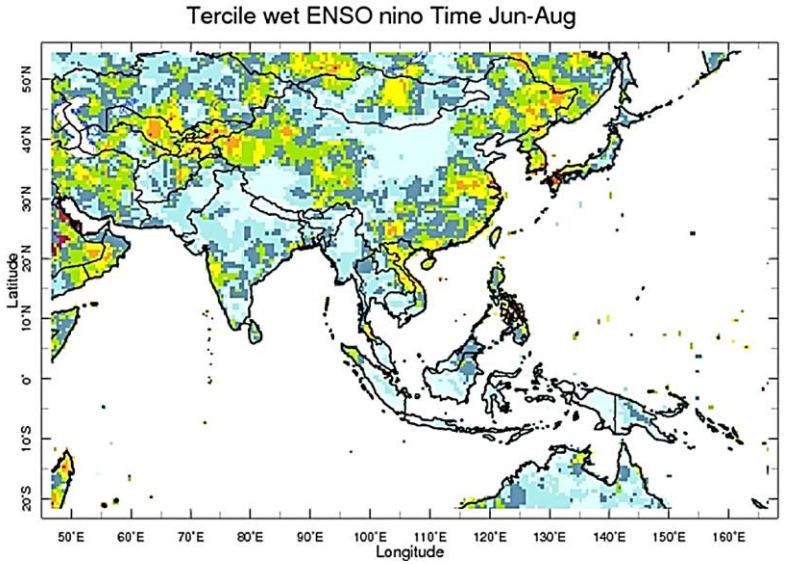
Characterizing El Niño: Comparison by episode.

Step 3: ASSESSMENT OF CHANGES IN PROBABILITY OF EXTREMES IN ASIA-PACIFIC





Step 3: Representing impacts derived from probability over different El Niño years gives confidence to take decisions based on forecast.

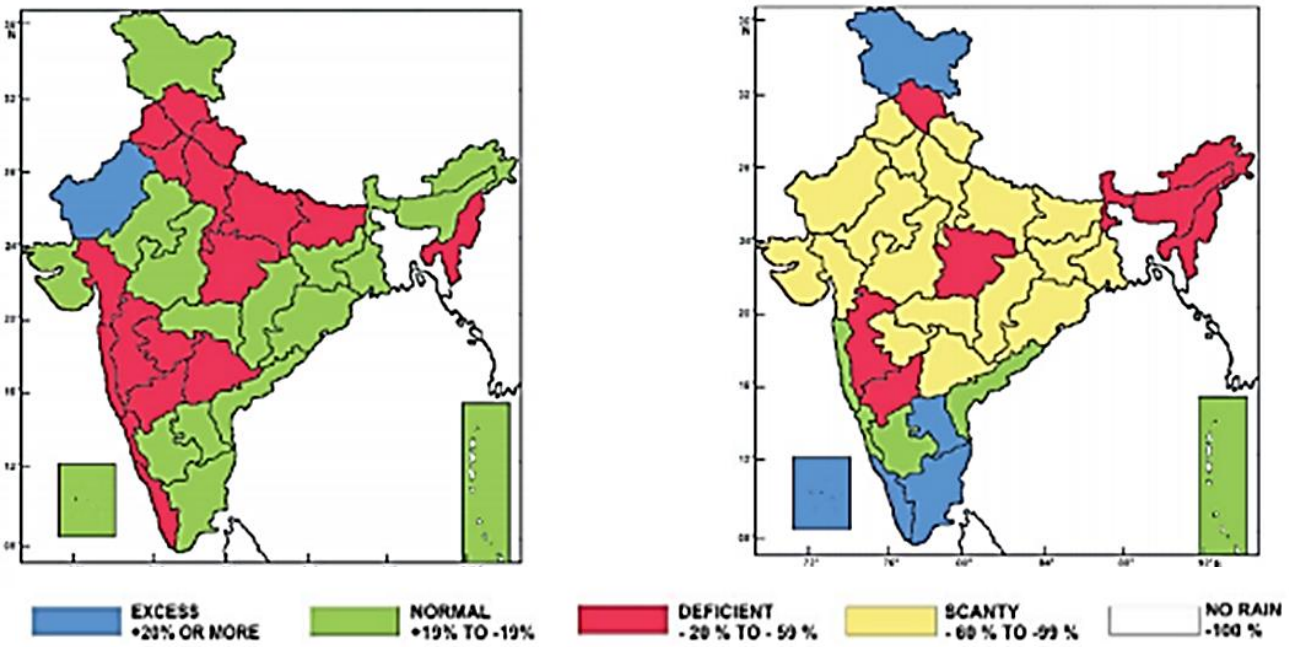


Probability of wet, normal, and dry conditions during Jun-Aug months over Asia-Pacific

Step 4: ASSESSMENT OF LIKELIHOOD OF EXTREME EVENTS IN CONTEXT OF SEASONS & REGIONS WITHIN THE COUNTRY

Step 1: Because space-time variation exists, contextualizing by season & region critical.

Estimating likelihood of temperature and rainfall extremes occurring in different seasons helps contextualize impacts.



Rainfall variability in India during 2015-2016 El Niño episode

Step 5: ASSESSMENT OF BIOPHYSICAL IMPACTS

Overview of biophysical impacts of El Niño by sector

Sectors	Negative impacts	Positive impacts
Agriculture	• Fall in crop production • Forest fire burning horticulture and agriculture lands in the forest fire prone zones • Loss in subsistence agriculture	• Optimal crop production unless it is not flooded
Water resources	• Drying up of rivers & water bodies • Falling of ground water level • Water scarcity for irrigation and drinking water supply	• Enhanced river flow • Surplus water in water harvesting structures and reservoirs • Optimal ground water level
Ecosystem	• Forest fires • Coral bleaching • Land degradation	• None
Infrastructure	• Infrastructure damages due to floods and cyclones • Damages to human settlements and	• None

Case: Potential bio-physical impacts in Indonesia during 2015-16 El Niño

El Niño phase	Drought	Flooding	Crop productivity	Water availability	Ecosystem	Infrastructure	Health
Developing	High		Medium	High		Medium	
Decaying		High				High	Medium