Assessing disaster losses to agriculture:
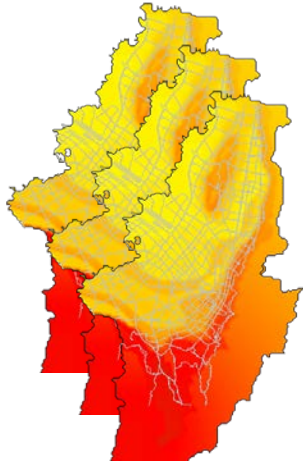## Outlining e-agriculture solutions

FAO-ITU E-agriculture Solutions Forum 2016
29-31 August 2016
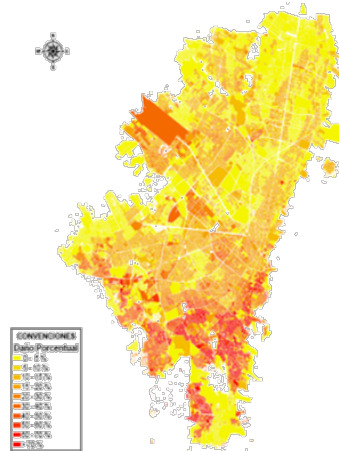**Bangkok**

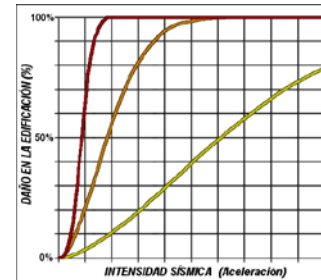# Drivers of e-agriculture solutions
Data, modeling and assessment

Hazard　　　　**Exposure**　　　　**Vulnerability**　　　　**Risk**

Value at Risk

Statistical - census and survey data

GIS/Geospatial– Infrastructure, settlements, land use..

Satellite images, probabilistic, geo-spatial and climate modeling, Cartographic and hydro-meteorological information

1 Key Message

The impact of disaster to agricultural sector is more in terms of indirect losses such as the cost of production, livelihood assets etc.
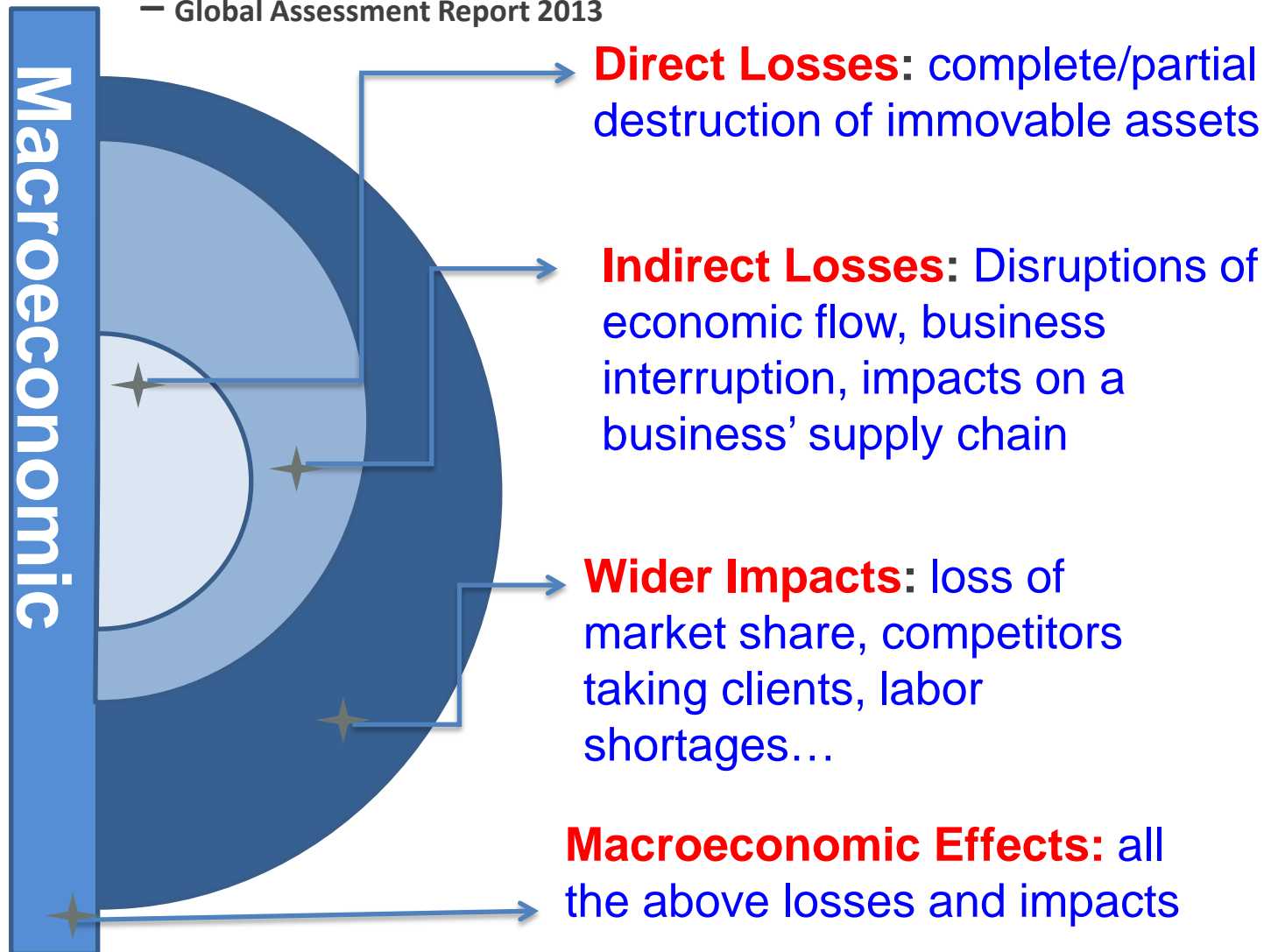
Accounting losses for building resilience to agriculture requires e-agricultural solutions using satellite images, statistical/ geo-spatial and climate modeling.

Damage and Loss Assessment:
Concepts

Close to 50 percent of disaster impacts are not accounted for
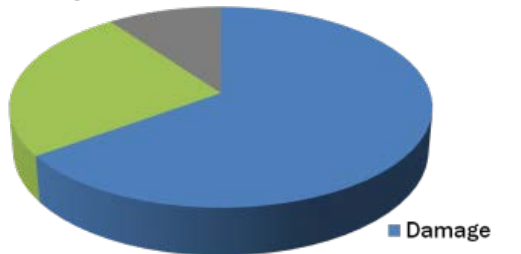
– **Global Assessment Report 2013**

Macroeconomic

Direct Losses: complete/partial destruction of immovable assets

Indirect Losses: Disruptions of economic flow, business interruption, impacts on a business' supply chain

Wider Impacts: loss of market share, competitors taking clients, labor shortages…

Macroeconomic Effects: all the above losses and impacts

Damage and Loss:
Typical Hazard Context

Earthquake

Damage
Loss
Higher Cost

75% Damage

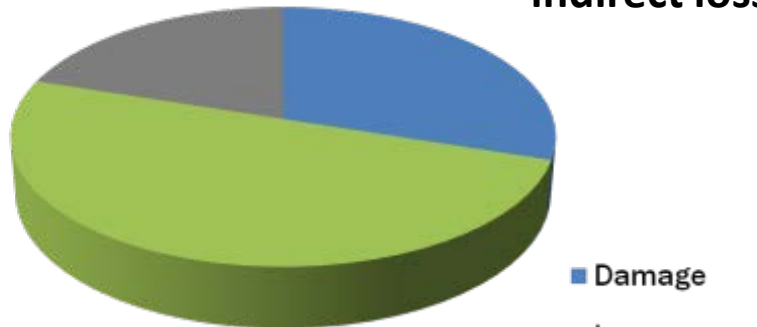- **Earthquake – Higher value of damage**
- **Floods and Cyclone – Higher value of damage and losses**
- **Drought – High value of losses**

Disaster effects on agriculture more on indirect losses than the structural damage

Floods

Damage
Loss
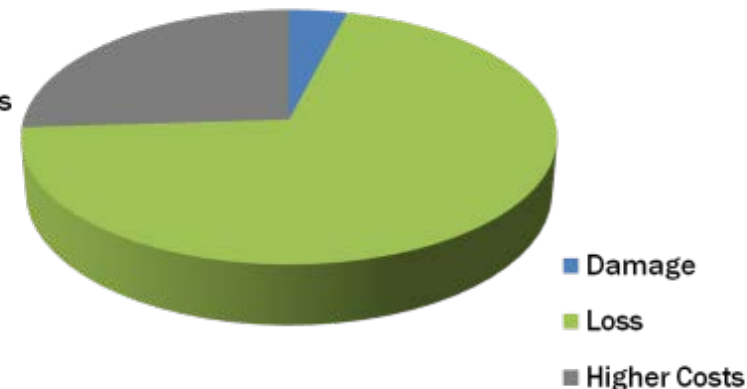**Higher Costs**

50% Damage

Droughts

Damage
Loss
Higher Costs

10% Damage

Assessing damage and loss

Three key questions

- How much is at risk?
- How much was lost?
- How much likely to be lost in the future?

PRE-DISASTER RISK ASSESSMENT:	**DISASTER LOSSES (PAST EVENTS)**	**DISASTER LOSSES (FUTURE RISK)**
Hazard, vulnerability, Exposure *- Geospatial approach* *- Probabilistic Approach*	Loss Accounting *- Recording impacts (damage and loss)* *- Measuring Trends*	*- Downscaling climate scenarios using geospatial approaches* *- Probability of losses / Average Annual Loss*

HOW MUCH IS AT RISK?

HOW MUCH WAS LOST?

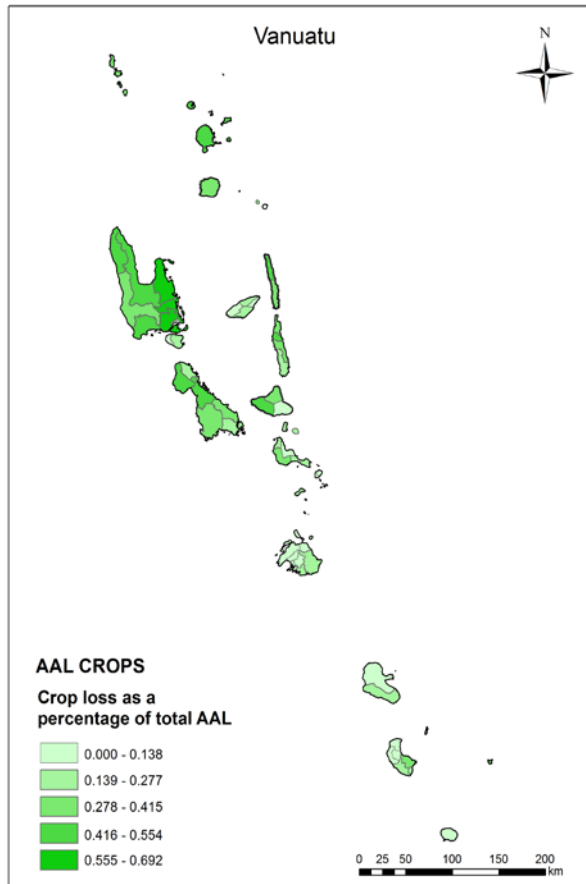HOW MUCH IS LIKELY TO BE LOST IN THE FUTURE?

2 Key Message

Probabilistic modeling coupled with geo-spatial data-sets helps assessing pre-disaster average annual crop losses due to multiple hazards – cyclone and drought
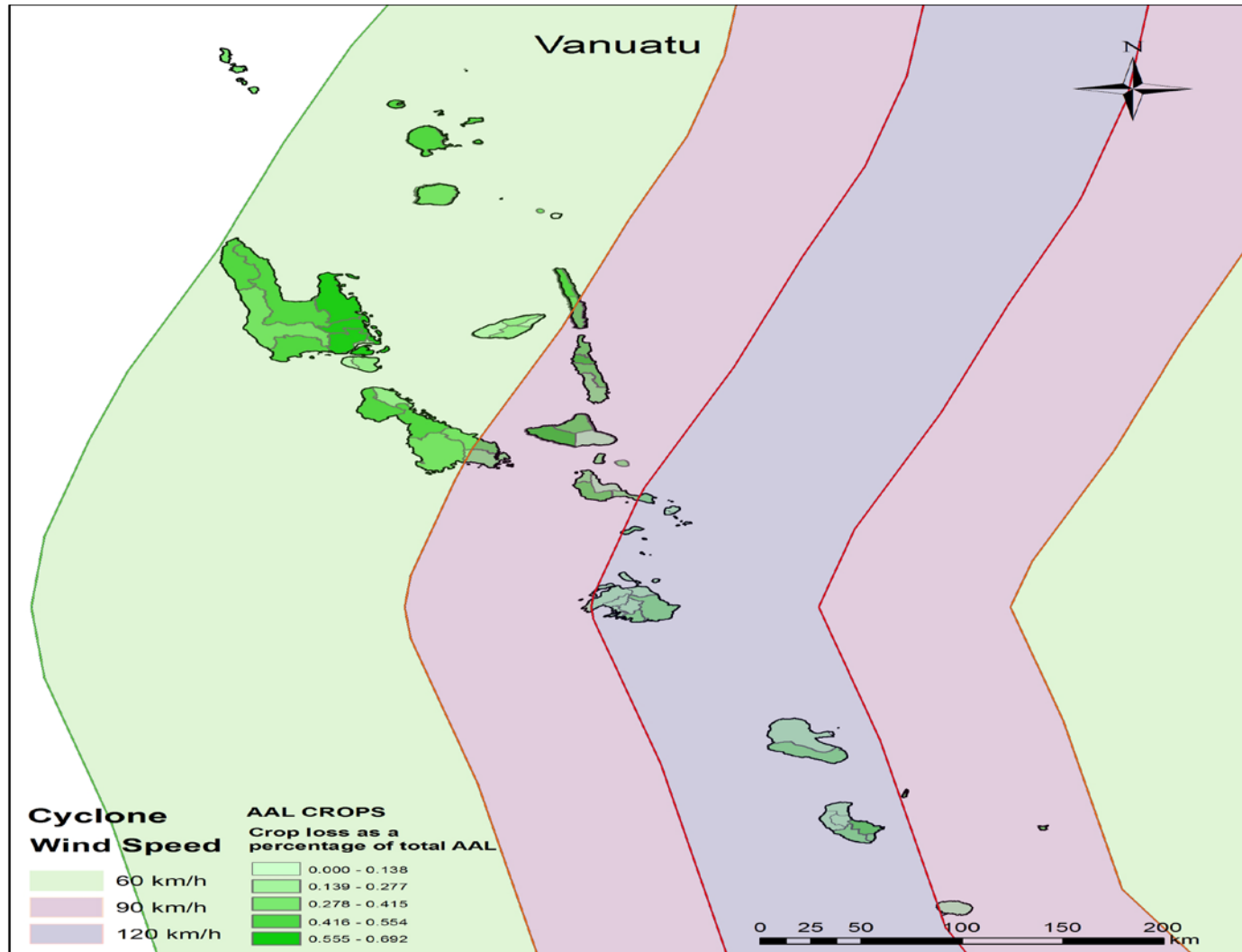
A Case Study from Vanuatu

Probabilistic Approach- *Average Annual Loss* (AAL): AAL in Pacific SIDS in agriculture sector (Vanuatu case study)

- Agriculture is the backbone of the Pacific Island economies.

- It is the main source of livelihood for the population as well as a major export earner.

- The proportion of crop loss as a percentage of total AAL is significant as in the Pacific SIDS.

Climate variability and AAL in Pacific SIDS in agriculture sector

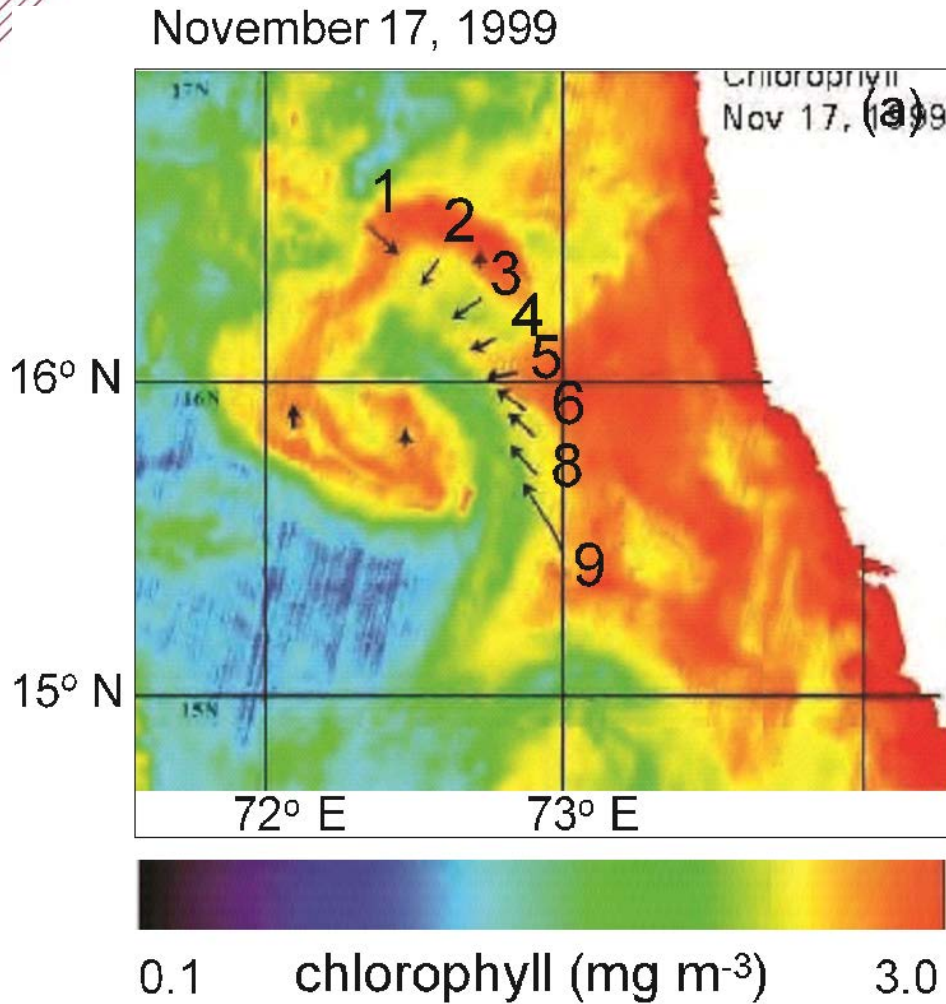Source: GDACS data, 2015, http://www.gdacs.org/resources.aspx

3 Key Message

Assessing post-disaster damage and losses require a time-series analysis of pre-and post-geo-referenced data from thematic earth observation satellites.

A Case Study from 2015/2016 El Nino Impact
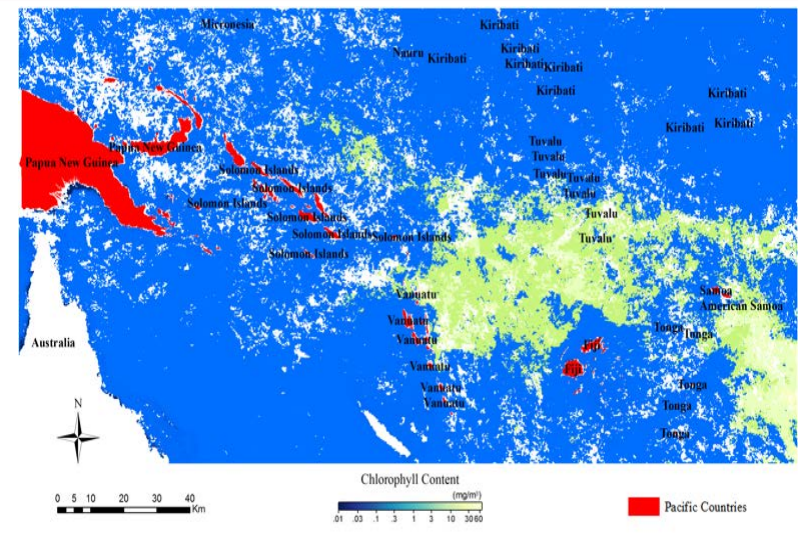
2015/2016 El Niño Impacts on fisheries

November 17, 1999

- Thermal remote sensing for chlorophyll identifying fishing grounds

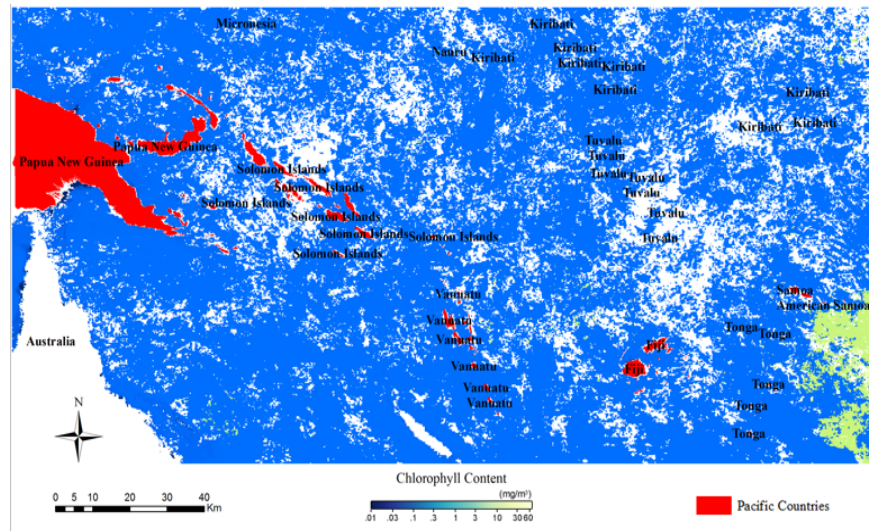- Higher catches reported for high chlorophyll areas (track 1-9)

Hokkaido, S.S, Chasso, E. et.al. (2009). Remote sensing applications to fish harvesting.

Determining regional risk for fisheries in Pacific Islands during an El Niño year
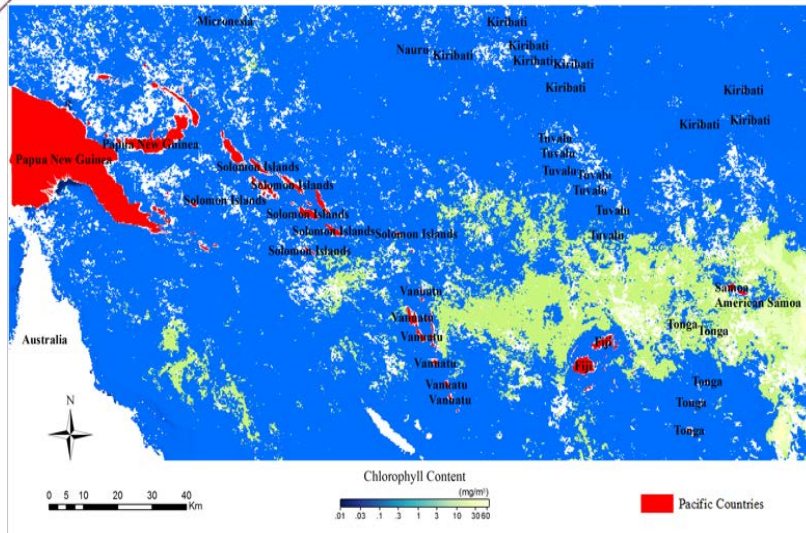
2005

2013

2015

NASA:
http://neo.sci.gsfc.nasa.gov/view.php?datasetId=MY1DMM_CHLORA
NASA-SeaWIFS:
http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/SEAWIFS_BACKGROUND.html
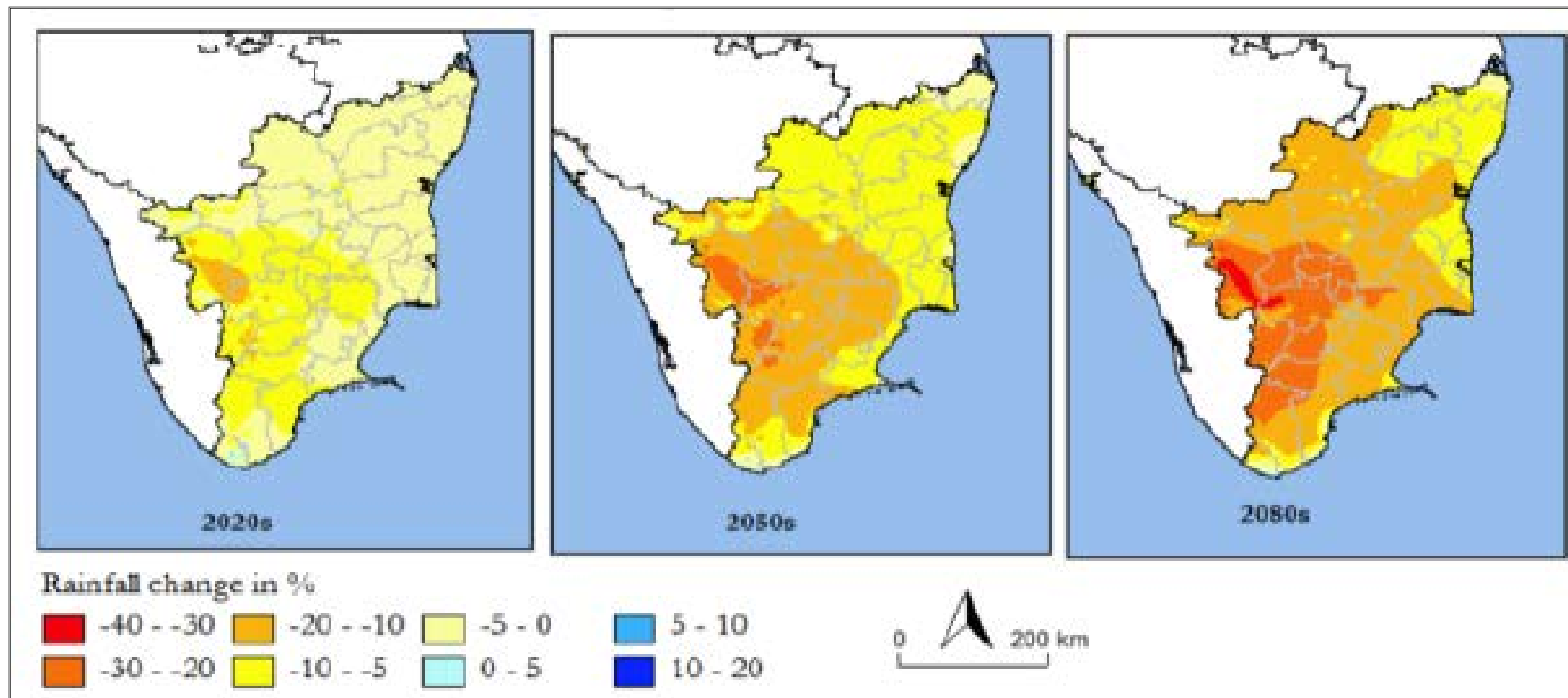Aqua-Modis:
http://oceancolor.gsfc.nasa.gov/cms/data/aqua

4 Key Message

Down-scaling of climate models at appropriate scale helps assessing long-term losses to agriculture

A Case Study from Tamil Nadu, India

Understanding climate risk for resilient development planning

Tamil Nadu in India is exposed to cyclones, heavy rainfall, floods, droughts and landslides. Downscaled climate scenario based models were used to assess the potential risk in agriculture, and related industry and service sectors for risk -sensitive development planning and decision-making.

Rainfall change in %

Color	Range	Color	Range	Color	Range	Color	Range
	-40 - -30		-20 - -10		-5 - 0		5 - 10
	-30 - -20		-10 - -5		0 - 5		10 - 20

2020s   2050s   2080s

0   200 km

Thank you

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