PRESENTATION

Climate Risk Assessments

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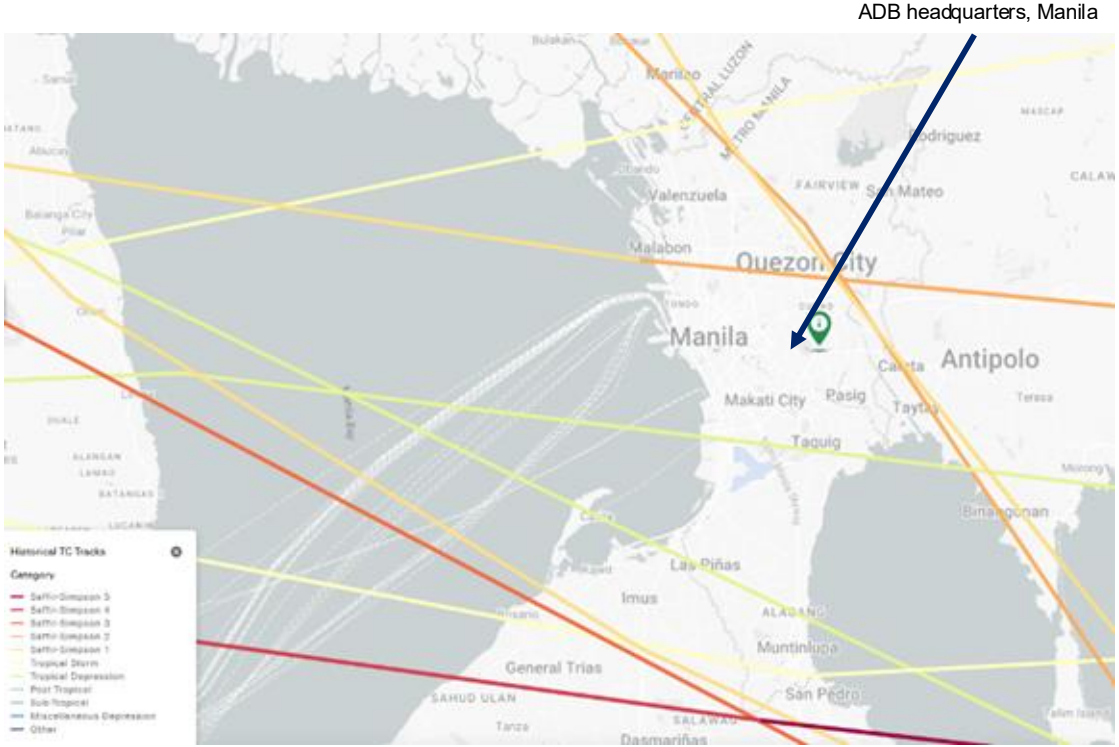
Approach and Methodology

- **Desk-based assessment using Swiss Re's proprietary CatNat® and global datasets - 20x20km resolution**
- **Scenario projection under SSP5-8.5 scenario for the year 2040.**
- **Results are based on observed historical events (typhoons, floods) and SR's in-house probabilistic risk models**
- **Conclusions were modified by local stakeholder engagement and input, and advice from reef ecologists**



Overview of key risks for the study sites in the four countries

PHILIPPINES

Higher Risk

Windstorm / tropical cyclone / Storm surge
due to ability to dislodge and break corals

Sea temperature extremes / heat stress
as anomalous temperatures can degrade coral health and cause mortality

Earthquake and tsunami
due to ability to dislodge coral and cover in sediment

Lower Risk

Precipitation / excess of rainfall
causes sediment, waste and pollution run-off into the reef; can also reduce ocean salinity

FIJI

Higher Risk

Windstorm / tropical cyclone / Storm surge
due to ability to dislodge and break corals

Precipitation / excess of rainfall
causes sediment, waste and pollution run-off into the reef

Lower Risk

Sea temperature extremes / heat stress
as anomalous temperatures can degrade coral health and cause mortality

Earthquake and tsunami
due to ability to dislodge coral and cover in sediment

INDONESIA

Higher Risk

Precipitation / excess of rainfall
causes sediment, waste and pollution run-off into the reef

Sea temperature extremes
as anomalous temperatures can degrade coral health and cause mortality

Lower Risk

Windstorm / tropical cyclone / Storm surge
due to wave action ability to dislodge and break corals

Earthquake and tsunami
due to ability to dislodge coral and cover in sediment

SOLOMON ISLANDS

Higher Risk

Windstorm / tropical cyclone / Storm surge
due to wave action ability to dislodge and break corals

Precipitation / excess of rainfall
causes sediment, waste and pollution run-off into the reef

Lower Risk

Extreme Sea Surface Temperature (SST)
as anomalous temperatures can degrade coral health and cause mortality

Earthquake and tsunami
due to ability to dislodge coral and cover in sediment

Example of windstorm risk across Siargao - Philippines

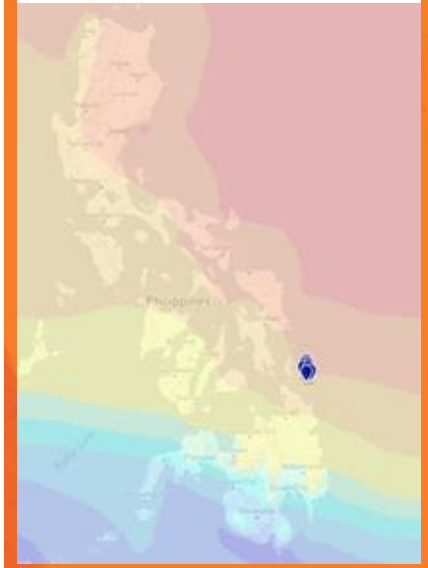
Current hazards

Northern Philippines is most susceptible to windstorms

Given the position of Siargao, while it is not in the highest risk category, it is still considered a high risk for windstorm activity.

Storm surge results from windstorm, which can damage the reef, often when over Cat 3

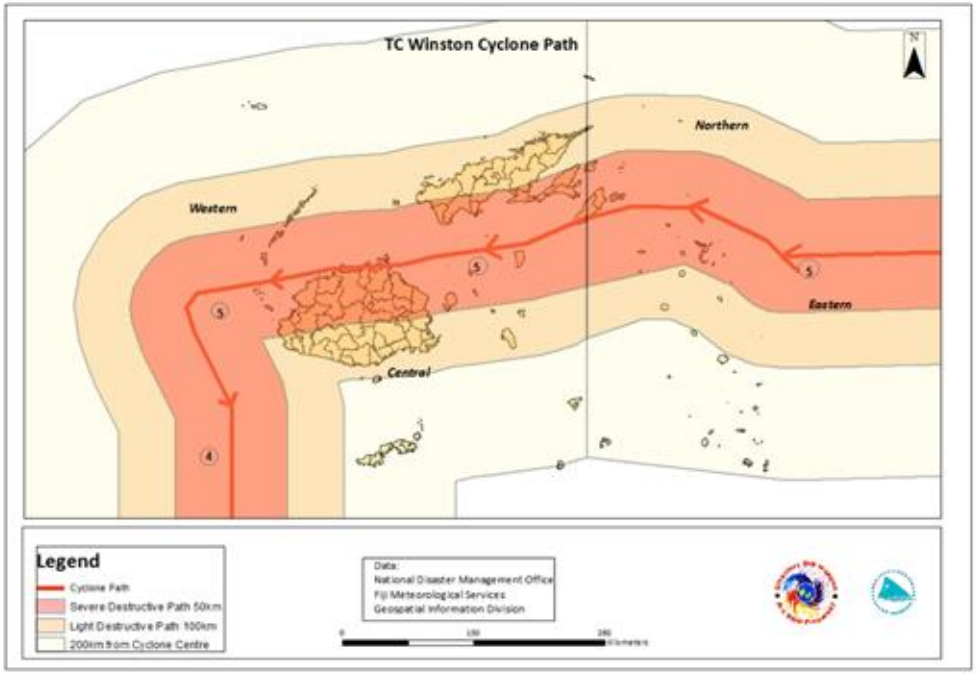
Philippines overview



Siargao

Example of windstorm risk for Denarau - Fiji

Tropical Cyclone using Fiji Metrological Service scale



Source: https://winston.gsd.spc.int/chart/TC_Winston_Winds_Buffer_Zone.jpg

Source: By Jasper Deng - Created by Jasper Deng using Wikipedia:WikiProject Tropical cyclones/Tracks. The background image is from NASA. Tracking data is from the National Hurricane Center[1] or the Joint Typhoon Warning Center[2]., Public Domain, https://commons.wikimedia.org/w/index.php?curid=130585028

Example:
Tropical Cyclone parametric insurance for Denarau / Nadi

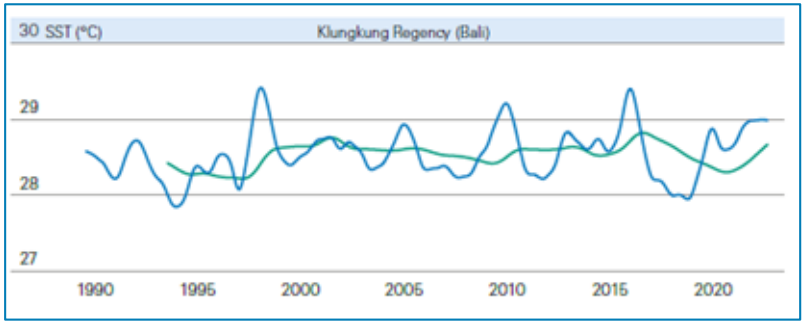
Heat stress for coral reefs in Nusa Penida - Indonesia

Sea Surface Temperature (SST)

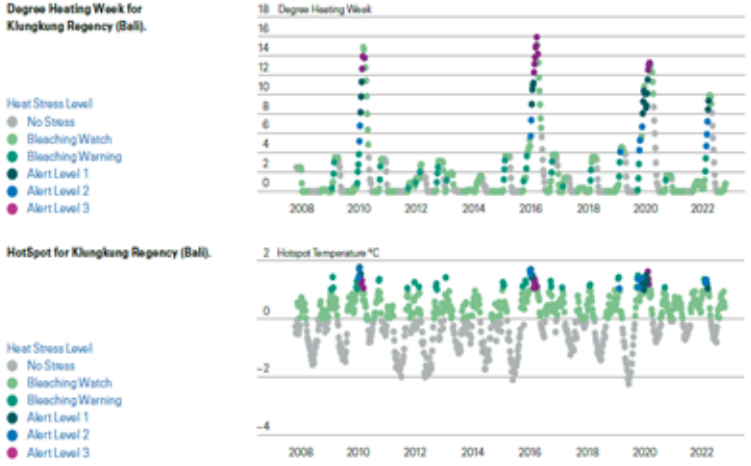
Recognizing the role of SST in influencing heat stress events for coral reefs, the data shows an increasing in SST over time.

Degree Heating Weeks (DHW)

Indicates that Klungkung experiences DHW > 8 which is highly likely to cause coral bleaching. DHW measures accumulated thermal stress over time. DHW reflects both intensity and duration of elevated SST relative to baseline.

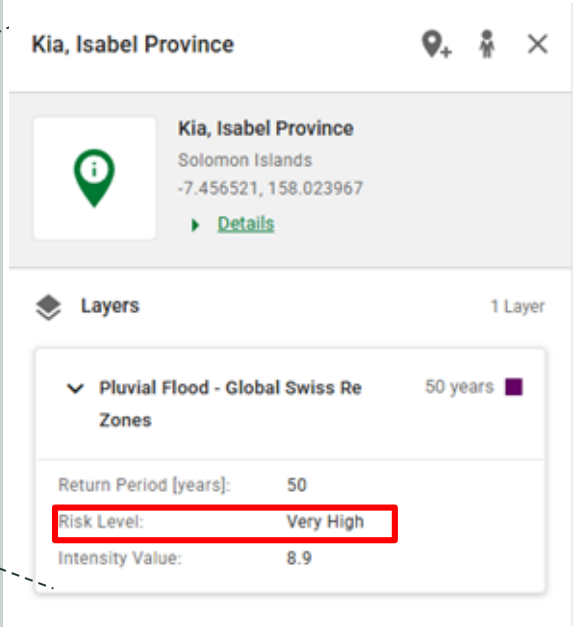


Sea Surface Temperature

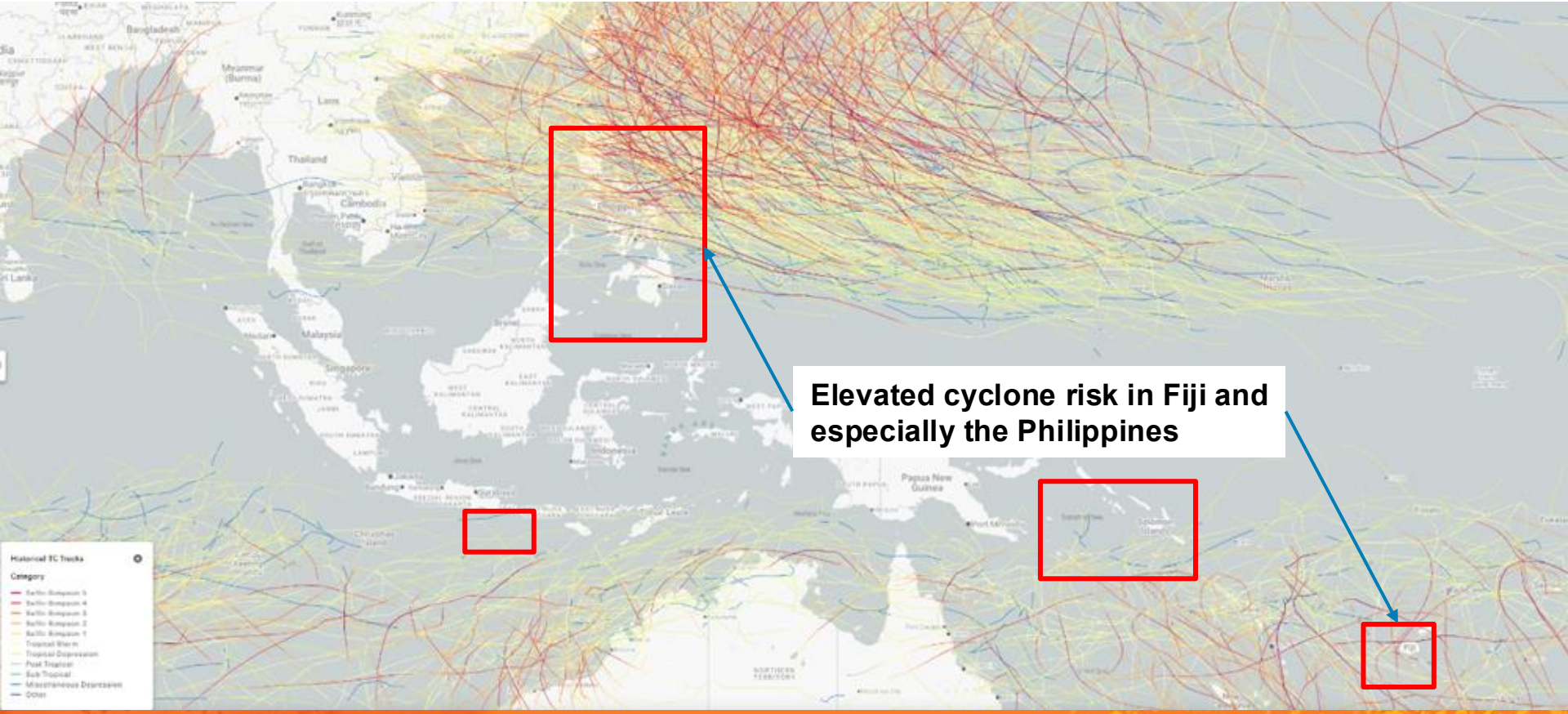


Pluvial flood risk for Arnavon Community Marine Park – Solomon Islands

Excess Rainfall causing run-off – high risk area nearby ACMP



Tropical cyclone tracks for the Asia-Pacific region between 1990-2020



Lessons learnt and takeaways from the assessments

There is no one-fits-all solution for natural perils

The desktop analysis needed to be adapted to the local conditions, perils and most importantly the local stakeholder inputs - e.g., high SST leading to coral bleaching; the local observations of sediment on reef at Crystal Bay in Nusa Penida

Future climate change

Incorporating future climate change impacts is challenging.

It needs to be part of the thinking, particularly about building the current state resilience of the reef.

Reef resilience to SSTs

Reef resilience to high SST seems to be quite location specific. For example, at some locations, DHW > 6 was linked to observed coral bleaching, but less so at other locations such as Nusa Penida which is buffered by protective value of currents and upwellings

Multidisciplinary approach required for understanding the key risks for coral reefs and local information and knowledge is imperative