

## FROM HAZARDS TO RISK

### *Hazard and Risk for Pacific Atoll Futures*



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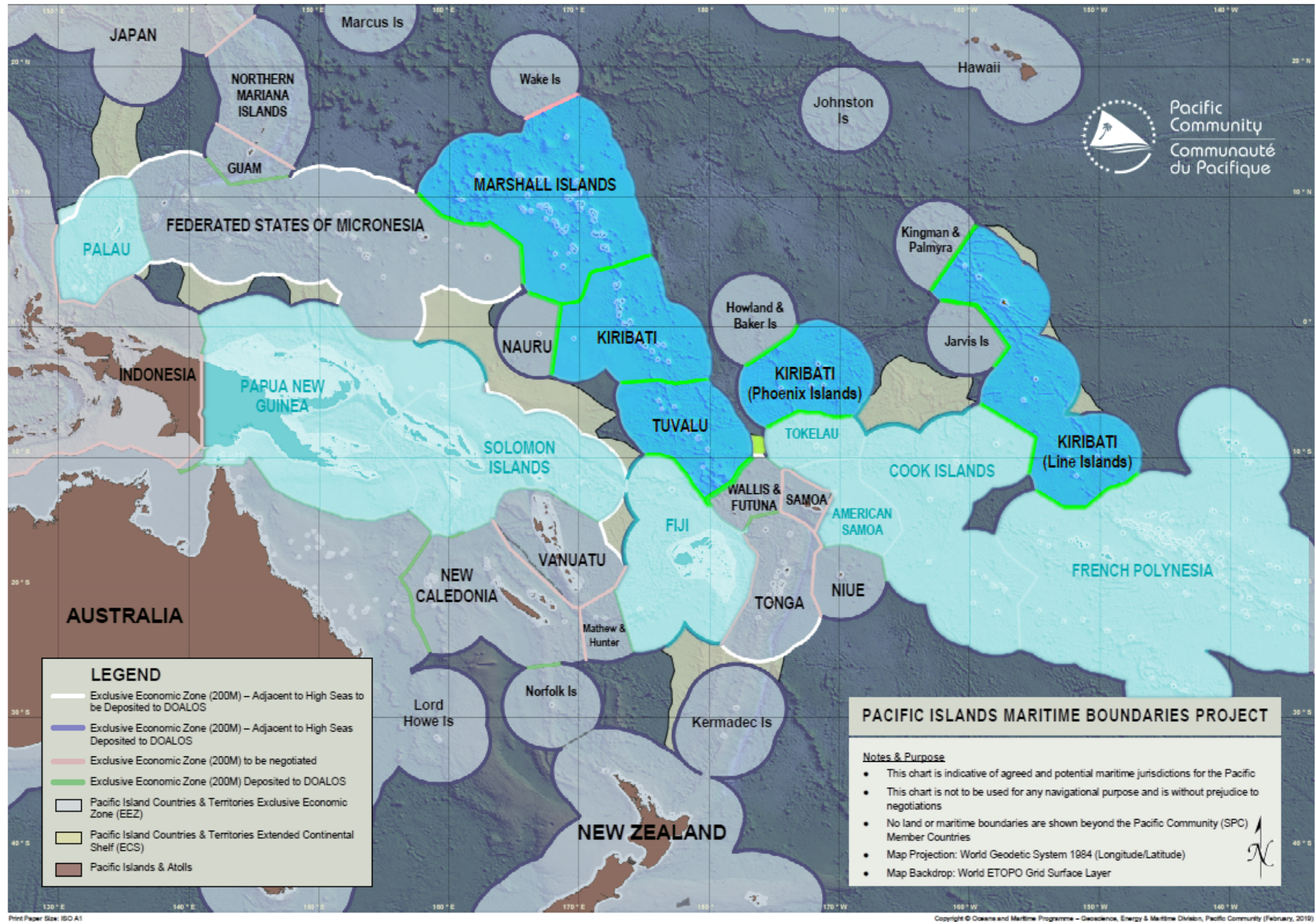
**Dr. Andrew Jones**

DIRECTOR – GEOSCIENCE, ENERGY AND MARITIME DIVISION

# PACIFIC ATOLLS

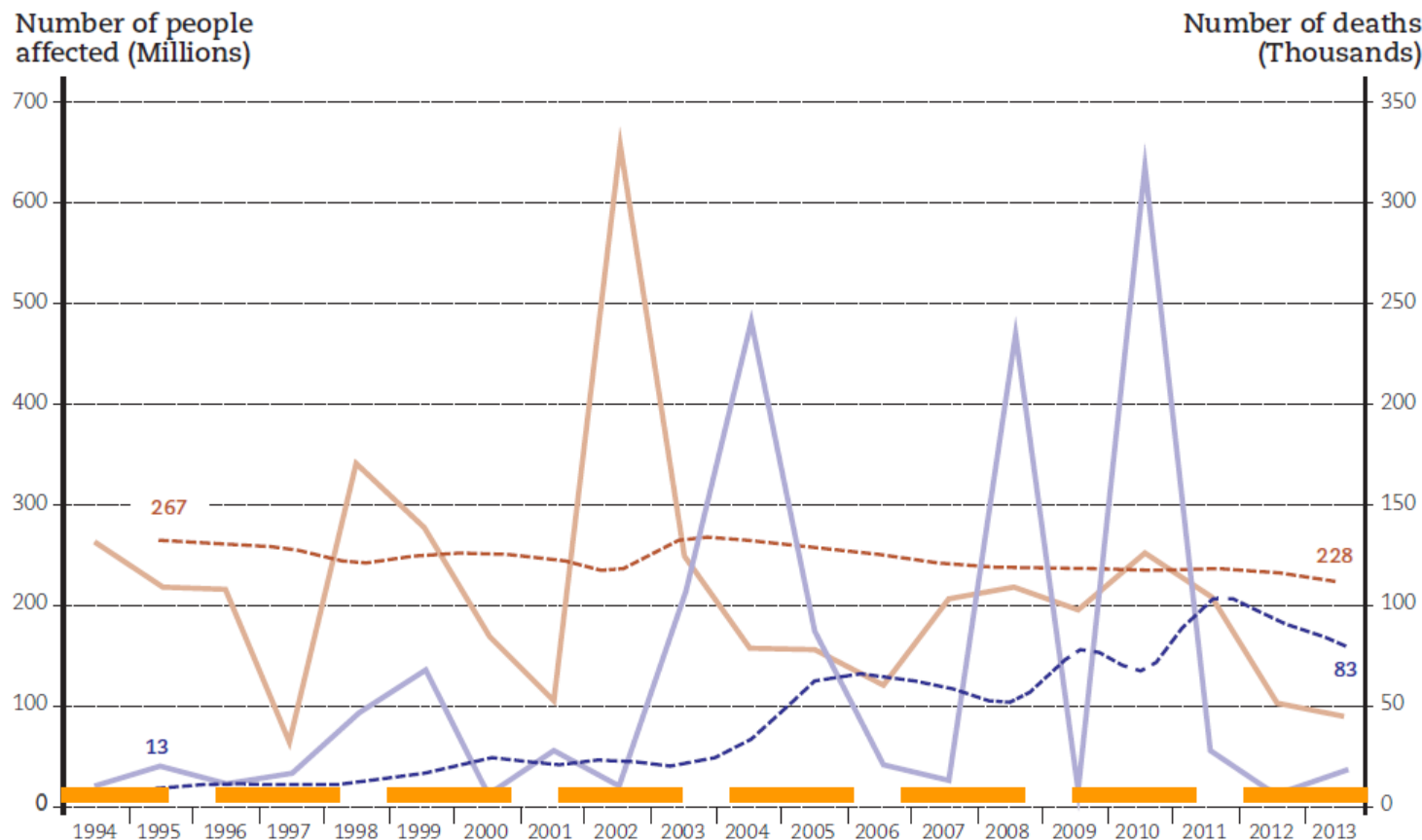
Atoll  
Nations

PICTs  
*with* atolls





# THE PACIFIC IN THE GLOBAL CONTEXT



Number of people affected & killed annually by natural disasters worldwide (1994-2013)

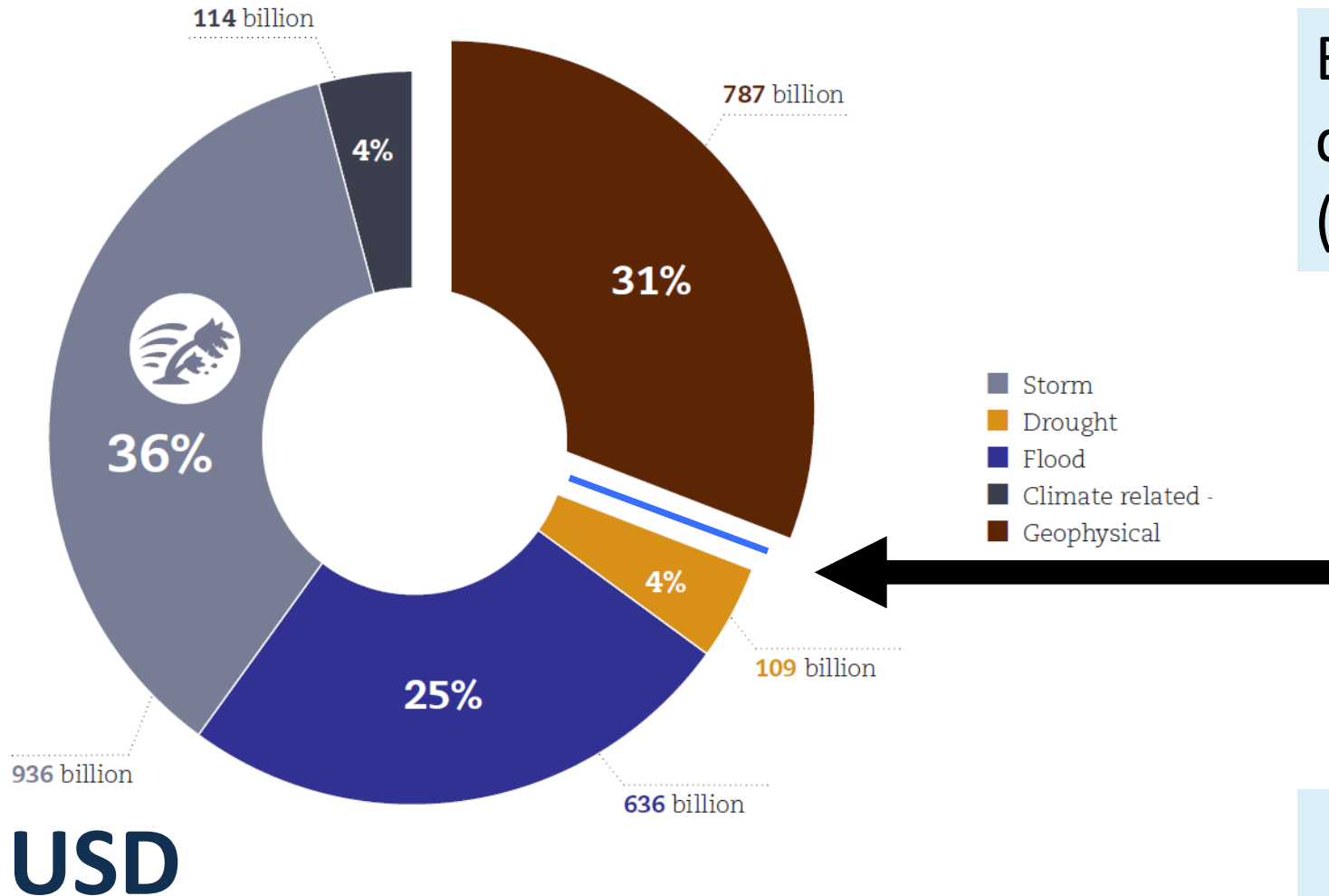
*If every Pacific person was affected by a disaster every year*



The Human Cost of Natural Disasters;  
A Global Perspective (2015)

— Affected  
- - Exponential smoothing trend - Affected  
— Deaths  
- - Exponential smoothing trend - Deaths

# THE PACIFIC IN THE GLOBAL CONTEXT



Breakdown of recorded damage by disaster type (1994-2013)

***If the combined GDP of Pacific Atoll Nations was wiped out by a disaster every year (1994-2003)***

The Human Cost of Natural Disasters;  
A Global Perspective (2015)



# THE PACIFIC IN THE GLOBAL CONTEXT

WORLD NEWS AUGUST 19, 2019 / 3:00 AM / 6 DAYS AGO

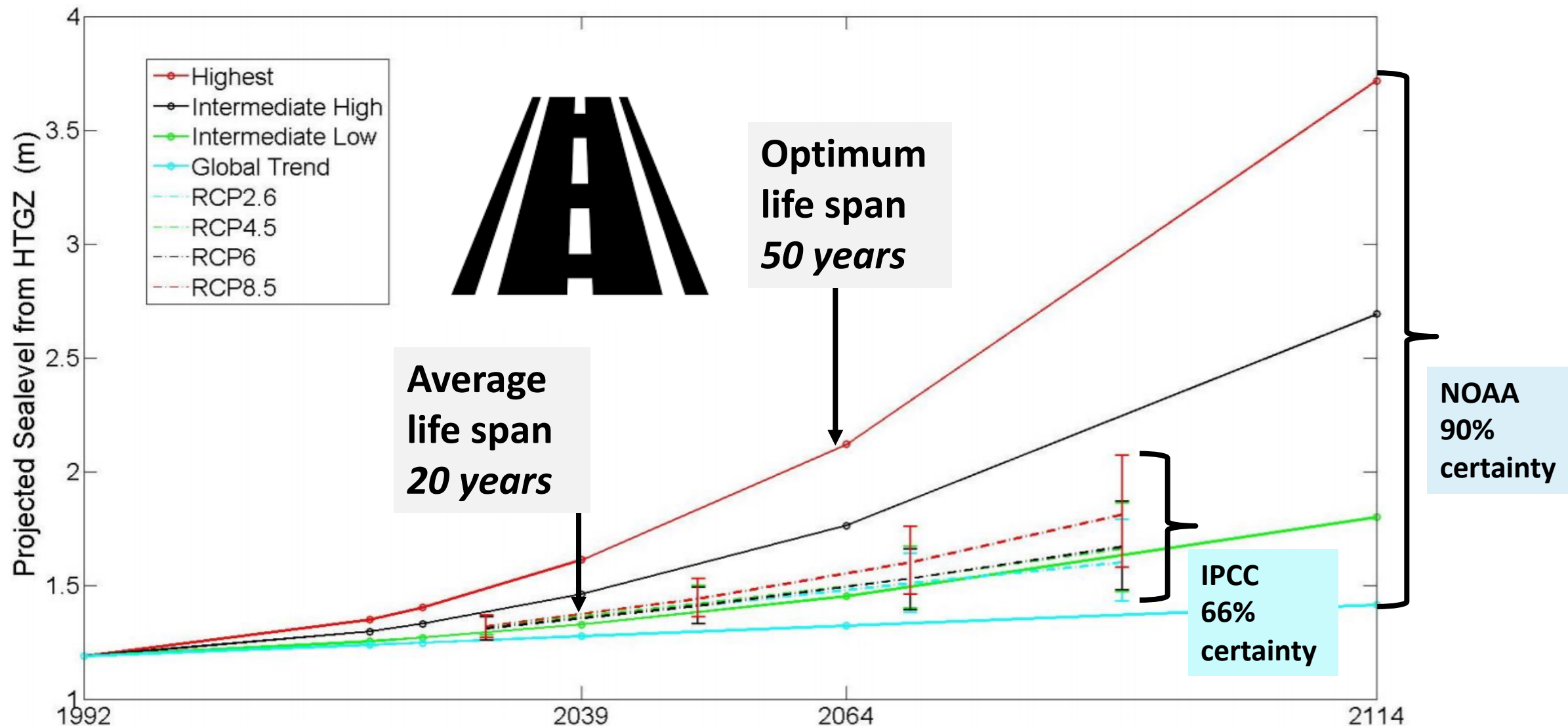
## Protecting Singapore from rising sea levels could cost S\$100 billion



*The Pacific has a small window of opportunity to gain global support*

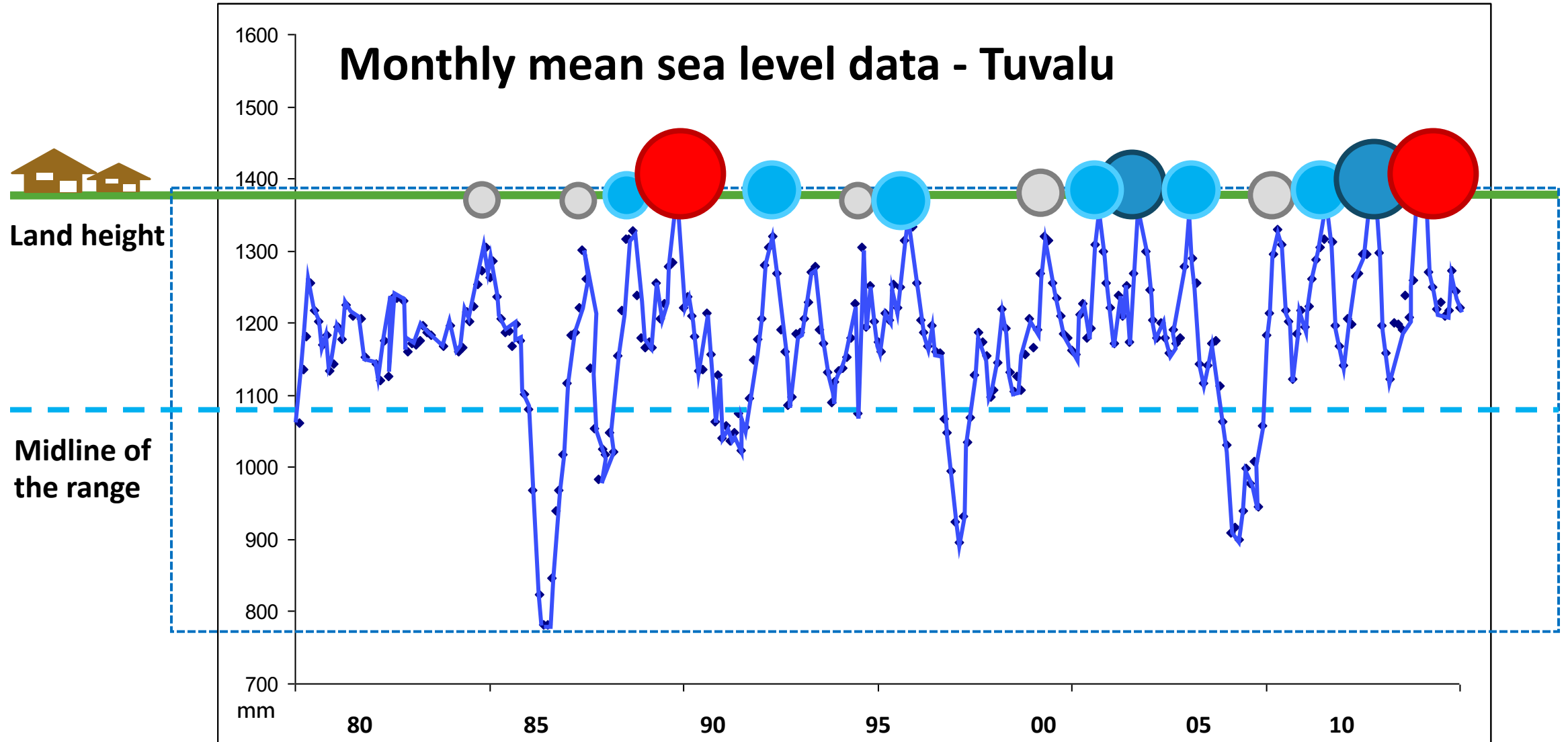
<https://www.reuters.com/article/us-singapore-economy-prime-minister/protecting-singapore-from-rising-sea-levels-could-cost-s100-billion-idUSKCN1V80GU?feedName=environmentNews&feedType=RSS>

# SEA LEVEL RISE – UNDERSTANDING RISK



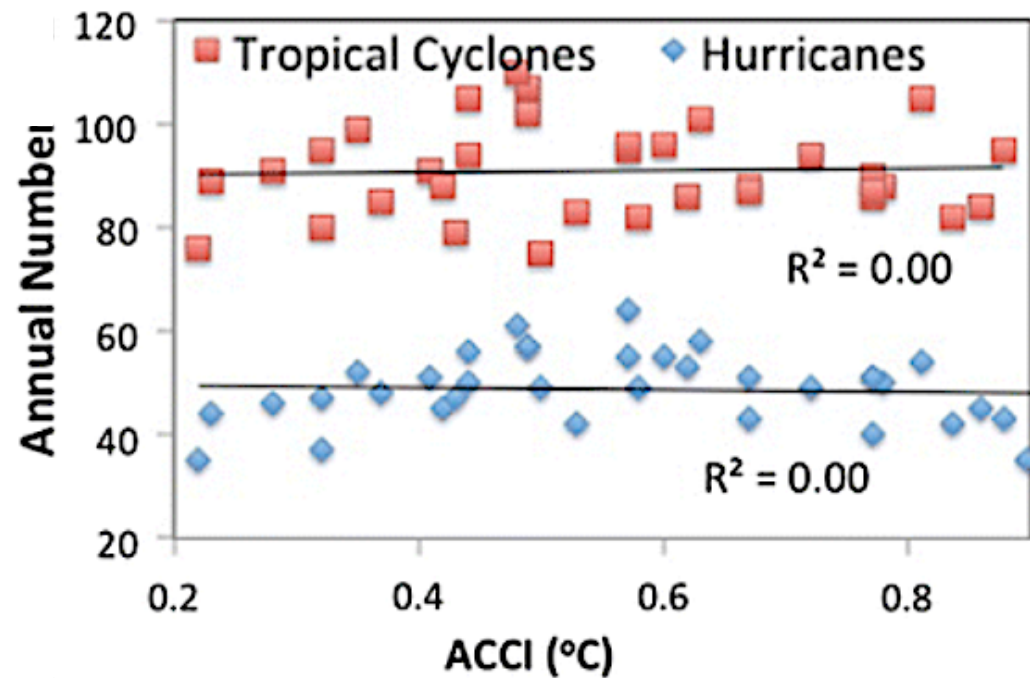


# CHANGING THE BASELINE

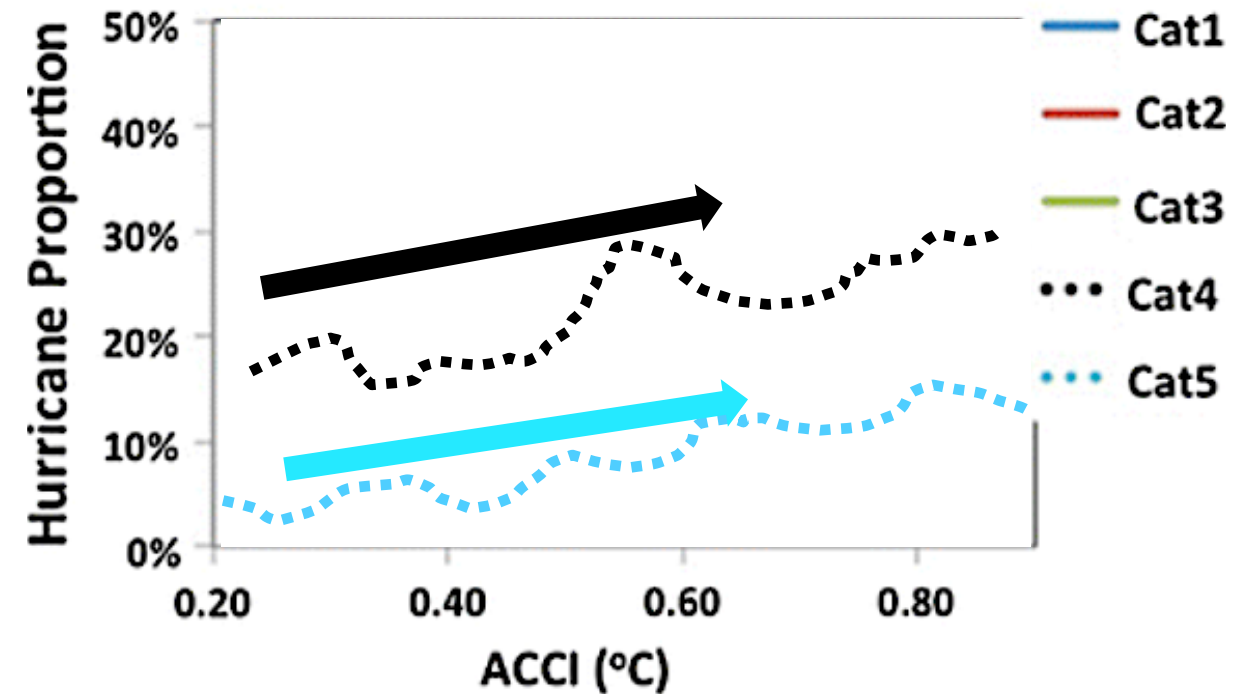


# MORE THAN SEA LEVEL RISE

## MORE FREQUENT



## TROPICAL CYCLONES





# ISLANDS IN EQUILIBRIUM



**The Fiji Times**  
Fiji's Own Paper  
SATURDAY, MAY 21, 2011 6 PAGES 90c W.P. THE FIRST NEWSPAPER PUBLISHED IN THE WORLD EVERY DAY

## Coast swamped

Sandy highway ... the waves reach the Queen's Highway as Ratu Ne makes his way to Vatukarasa Village yesterday.

**TIDAL SURGE** Giant waves flood hotel rooms

By FELIX CHAUDHARY

ONE school was closed and a village dwelling was damaged as tidal surges entered hotel rooms along the Coral Coast yesterday.

Nadiri Bay Klakasa School was closed yesterday after tidal swells uprooted trees and washed away debris while residents living in a house perched by the sea in Vunivala Village scrambled to safety after it was flooded with seawater causing some damage to the dwelling.

At nearby Yaba Village, the tidal surge destroyed temporary shelters used as cooking houses as water raced 10m into the village.

Korolevu police reported that apart from the house flooding in Vunivala Village, there were no other significant events that occurred as a result of the tidal surge.

"As a result we instructed children that were arriving to school to return to their homes as a safety precaution," said Nadiri Bay Klakasa School headteacher Bir Chand.

At nearby Yaba Village, the tidal surge destroyed temporary shelters used as cooking houses as water raced 10m into the village.

Korolevu police reported that apart from the house flooding in Vunivala Village, there were no other significant events that occurred as a result of the tidal surge.

People living along the Coral Coast should expect more big swells over the next few days.

According to Coral Coast weatherman, Robert Kennedy, the tidal surges are brought about by a high pressure system in the South.

"In Fijian the word for what is happening is *sa laka*. This is a common occurrence during this time of the year," he said.

Mr. Kennedy, owner and operator of Sandy Point Beach Cottages, said in the past the tidal surges broke seawalls and washed debris over the road.

"We have had bigger swells in the past," Mr. Kennedy said.

The duty weatherman at the Meteorology Department in Suva confirmed the swells were generated by a high pressure system to the South, intensified by high tides.

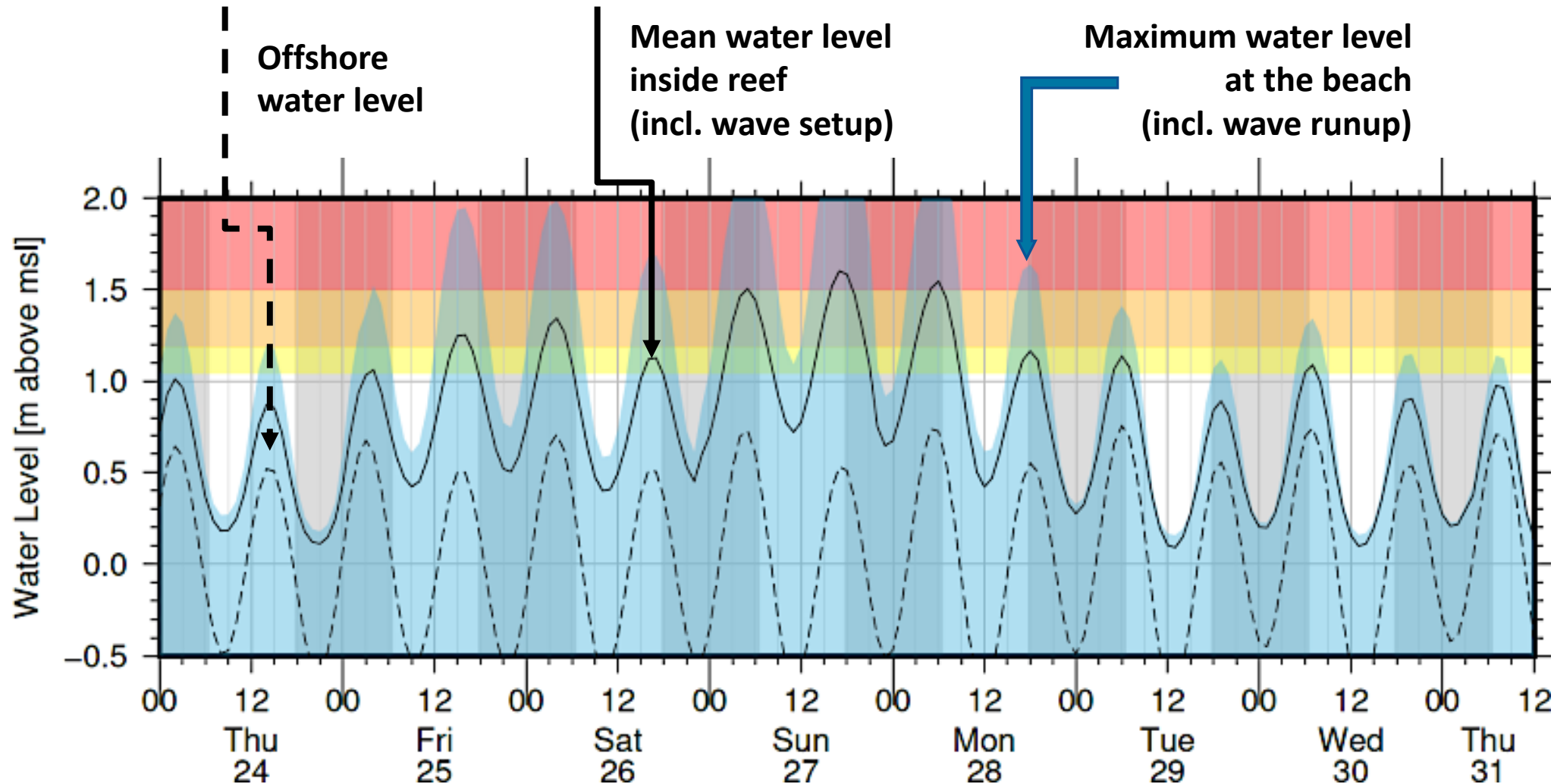
"We have issued a warning to people living along the coastal areas in Southern Viti Levu, Kadavu, Lau, and Southern Lau Group."

At 9pm last night before high tide at 9pm, coastal villagers should ready to move to higher ground if the waves intensified in size.

■ More on PAGES 2-3

Since 1869 ONE PEOPLE ONE NATION ONE DESTINY www.fijitimes.com.fj

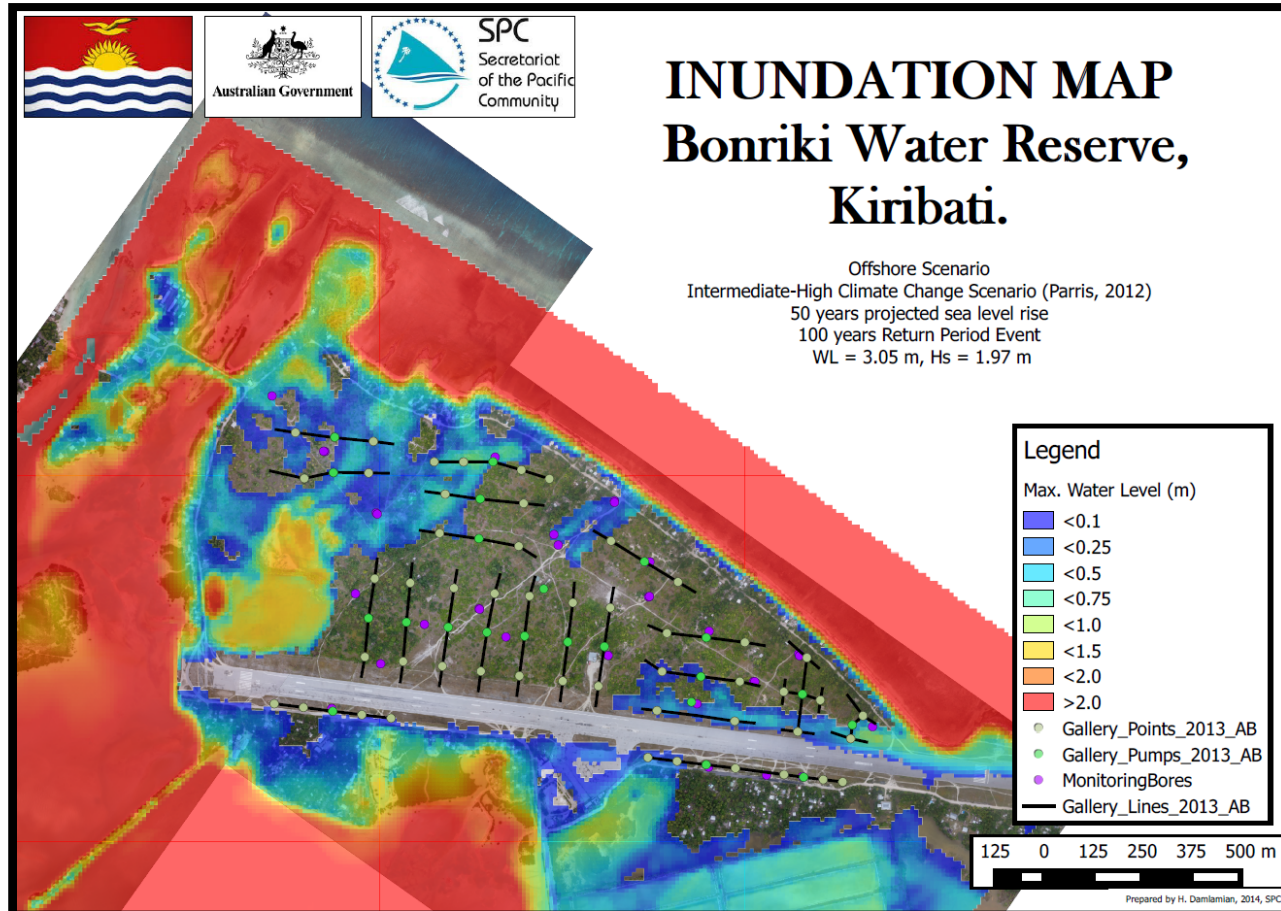
# NUMERICAL MODELLING: INUNDATION IMPACT FORECASTING



28th May,  
2018



# RISK ASSESSMENT TO SUPPORT PLANNING



## Key Findings:

- Groundwater impacted only where inundation occurs
- Groundwater recovers with rainfall recharge (2-6 years dependent on recharge scenario)
- Extraction and rainfall recharge are most critical

Inundation modelling for 4 different SLR projections, & 3 probability events.  
(20, 50, 100 yr RI. 72 scenarios reviewed)

# PACIFIC DATA AND TOOLS

Hazard and Risk Data

Hazard preparedness &  
Risk mitigation tools

Accessible portals

Atoll specific...?



## PacSAFE




SPC  
Secretariat  
of the Pacific  
Community


PacSAFE has initially been developed to enable hazard data and asset data, such as the Pacific Catastrophic Risk and Financing Initiative (PCRAFI) asset database, to be used to general impact information to assist planning, preparedness and response activities for Pacific Island Countries. It is based on InaSAFE and QGIS.

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### PARTner (Pacific Risk Tool for Resilience)



Published: 9 May 2018



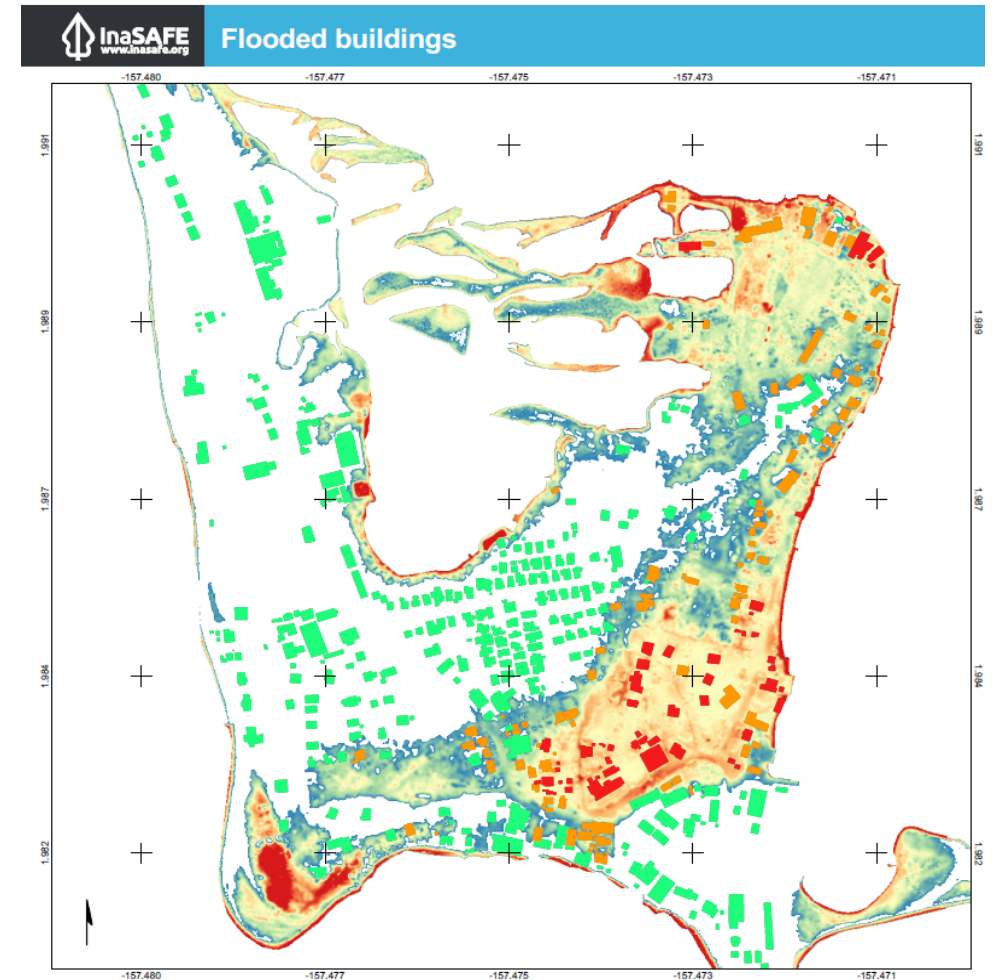
Working with Pacific communities to predict, plan and prepare for the harm caused by disasters, using RiskScape, a software programme which estimates impacts and losses from natural hazards.

# RISK ASSESSMENT TO SUPPORT DECISION MAKING

$$\text{RISK} = \text{LIKELIHOOD} \times \text{CONSEQUENCE}$$

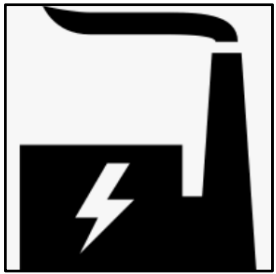
		CONSEQUENCE				
		<i>Insignificant</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>	<i>Catastrophic</i>
LIKELIHOOD	Almost Certain	Low	Medium	High	Extreme	Extreme
	Possible	Low	Low	Medium	High	Extreme
	Rare	Low	Low	Low	Medium	High

LONDON, KIRITIMATI, KIRIBATI

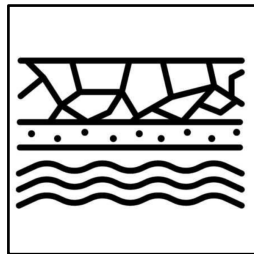


# ATOLL INVESTMENT: THE PAST

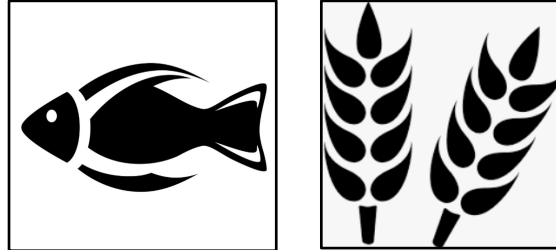
Energy security



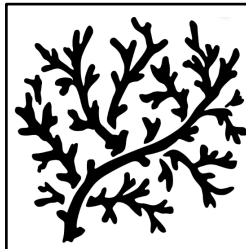
Water security



Food security



Healthy atoll & reef



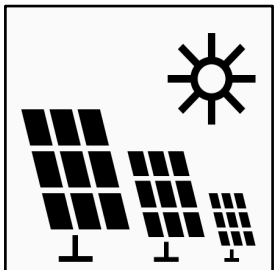
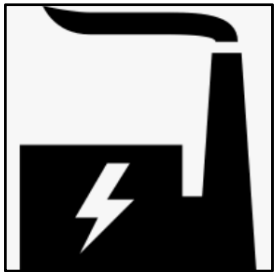
**Hazard lens**



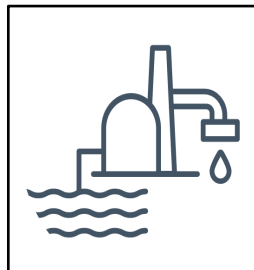
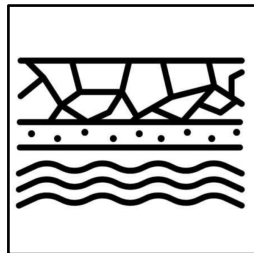


# ATOLL DEVELOPMENT PLANNING: THE PRESENT

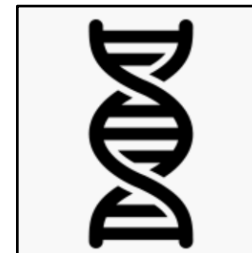
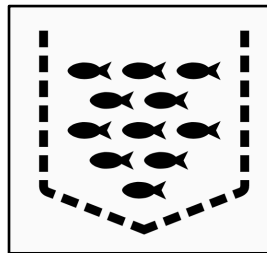
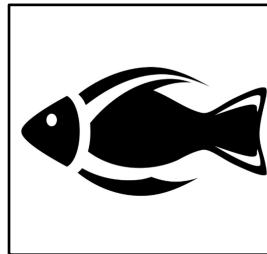
## Energy security



## Water security



## Food security & prosperity



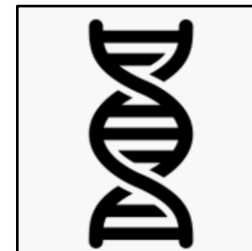
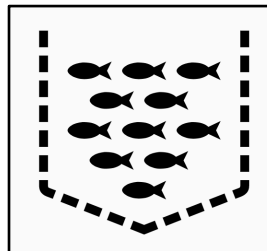
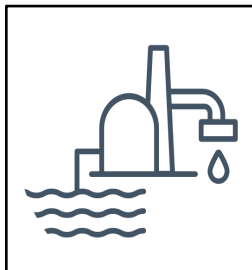
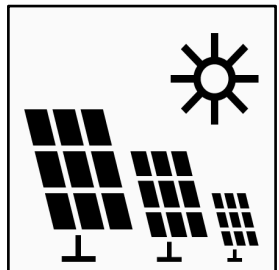
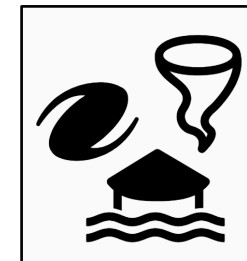
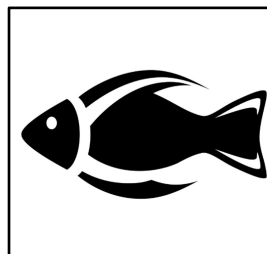
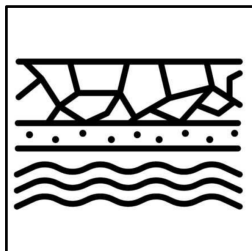
## Hazard lens



## Climate lens

# ATOLL DEVELOPMENT PLANNING: THE FUTURE

SUSTAINABLE ~~URBAN~~ ISLAND PLANNING



*As Leaders of the Pacific Islands Forum, we recognise that to lead is to act and ... we know more needs to be done. To secure the future of our Blue Pacific, we have pursued and must continue to pursue, bold and innovative regional solutions recognising that each of our nation's futures, as well as the actions we choose to take, are interconnected.*

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KO RAB'A, FAKAFETAI