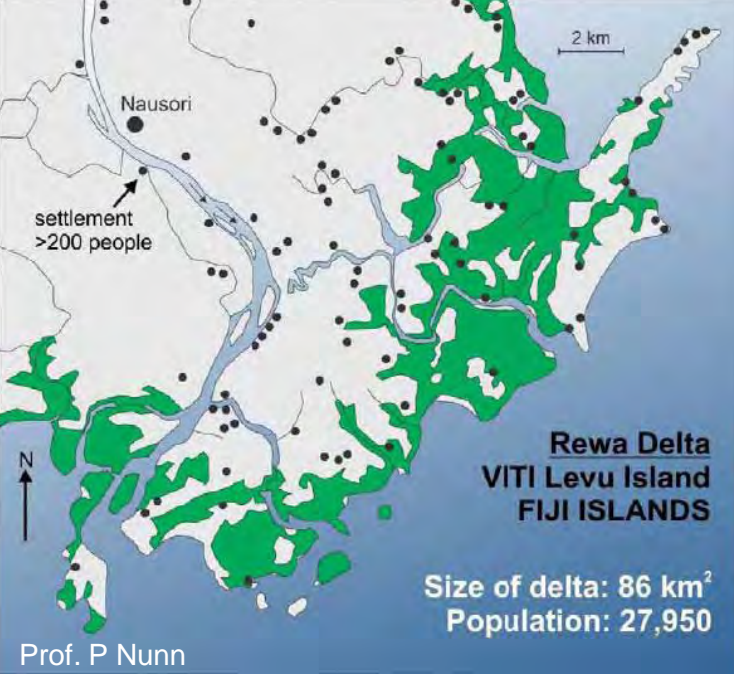


# Assessment of climate change on drainage networks and Infrastructure in Fiji

## Pacific Adaptation to Climate Change





# Purpose

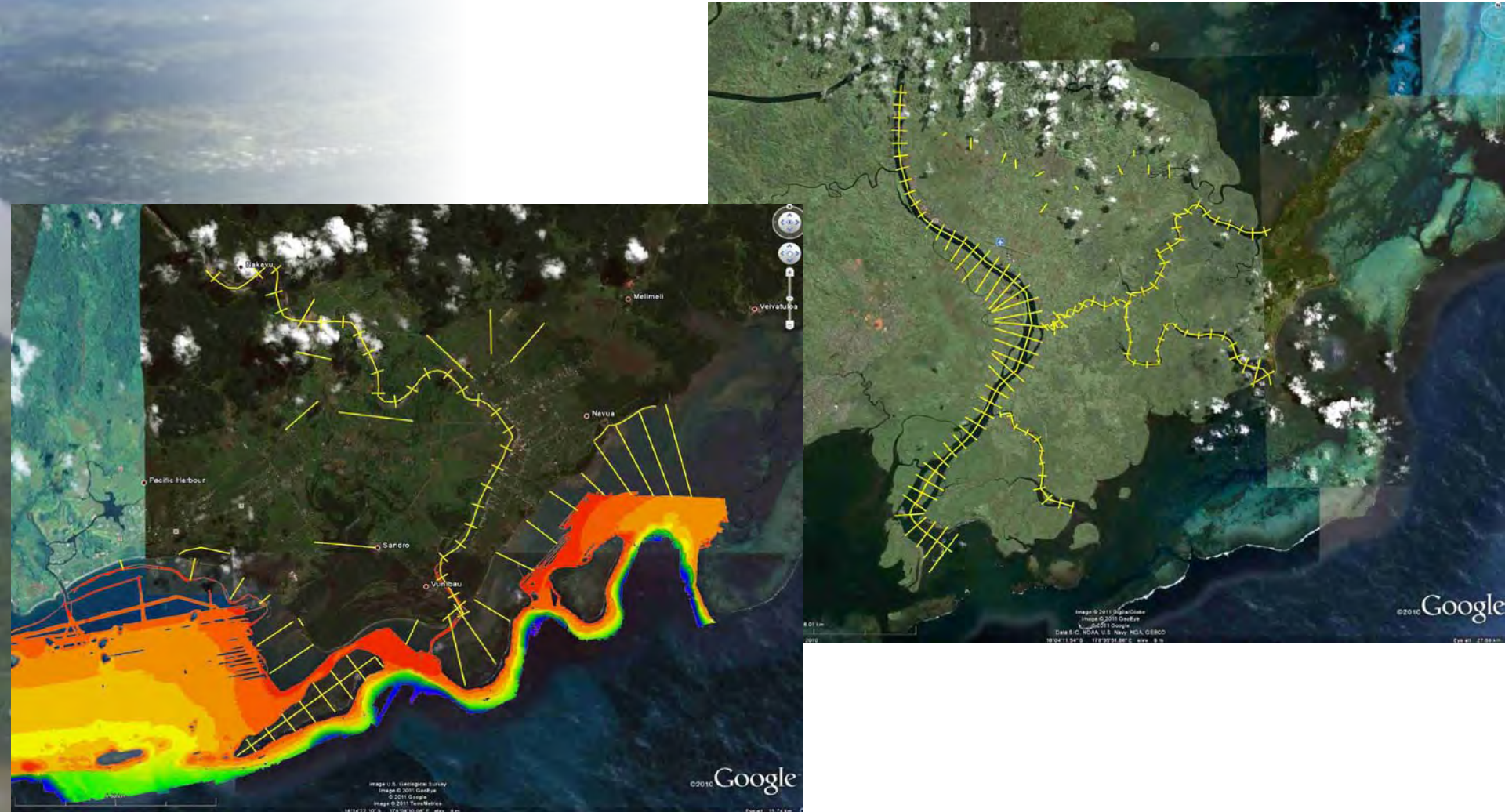
- Develop baseline information necessary to support a risk-based approach to climate change adaptation in the project demonstration sites.
- Assess how climate change and sea-level rise will impact agricultural drainage schemes in the Rewa and Navua deltas.
- Provide a sound, objective and evidence-based framework for developing climate change adaptation strategies for development of drainage guidelines and demonstration of adaptation interventions.
- Demonstrate an approach that is scalable and can be transferred and applied to other areas in Fiji.

# Project Components

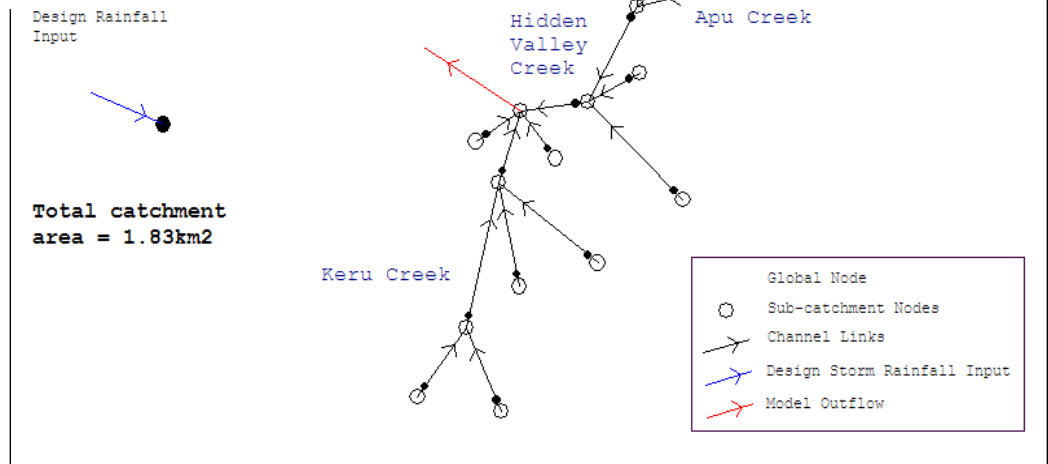
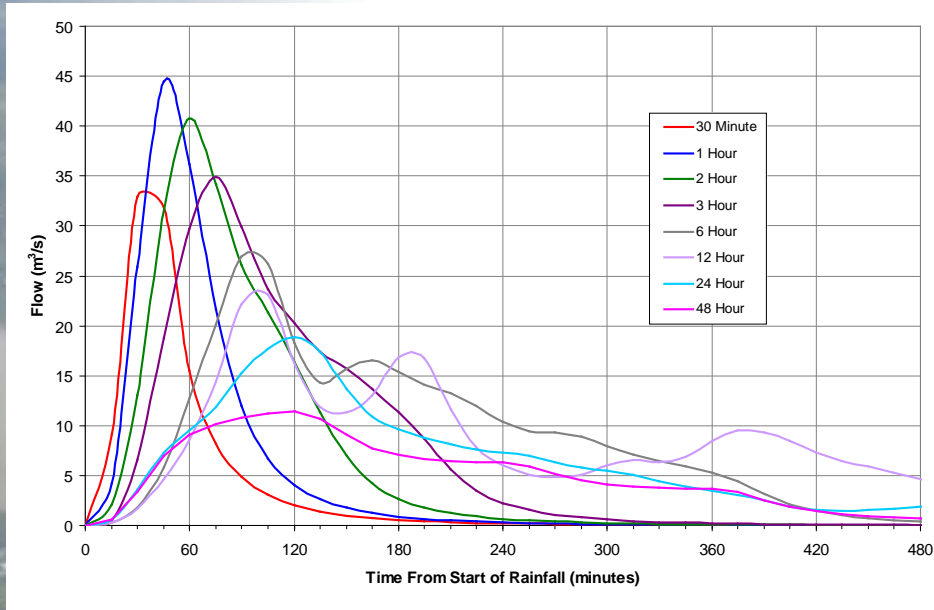
- Climate change
  - Extreme rainfall
  - Sea level rise and extreme water levels
- Field topography and bathymetry data collection
- Hydraulic (drainage) and hydrological (river) modelling
- Socio-economic community vulnerability assessment
- Options development and appraisal
- Tools and guidance products to use and apply the information developed.



# Field data collection



# Hydrologic and hydraulic modelling





# Tools

**Input data**

1. Select location

2. Enter future climate change criteria

Emissions scenario:

Future timeframe comparison:

3. Enter rainfall duration to plot

**Results: Depth - Duration - Frequency**

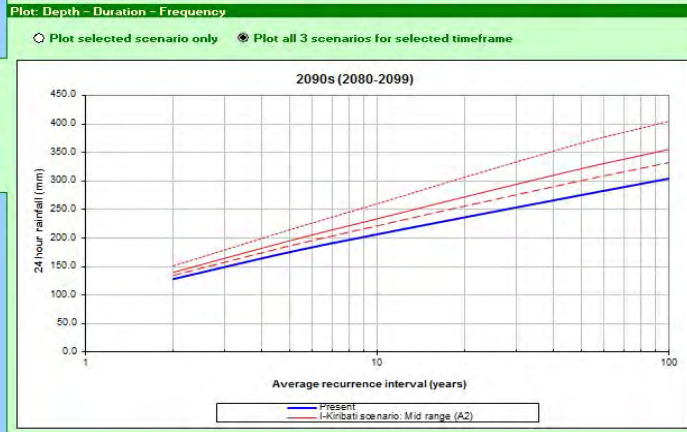
**Present day (mm)**  
 Based on data analysed between: 1971-1994  
 Assumed to be representative of the period 1980-1999

ARI (year)	AEP (%)	10 min	20 min	30 min	1 hr	2 hr	6 hr	12 hr	24 hr	48 hr	72 hr
2	50%	19.1	23.3	36.8	49.6	63.6	100.1	115.9	128.3	149.6	163.4
5	20%	24.8	38.5	46.5	63.3	81.7	133.5	157.1	175.4	203.1	220.7
10	10%	28.5	44.6	52.9	72.4	93.7	155.6	184.4	206.6	238.5	258.7
20	5%	32.1	50.4	59.0	81.1	105.1	176.9	210.6	236.6	272.5	295.1
50	2%	36.7	57.9	66.9	92.3	120.0	204.3	244.4	275.3	316.4	342.2
75	1.3%	38.7	61.3	70.4	97.3	126.5	216.4	259.3	292.3	335.7	362.9
100	1%	40.1	63.6	72.9	100.8	131.1	224.9	269.8	304.3	349.4	377.5

Future timeframe: 2090s (2080-2099)      Emission scenario: NIWA Report: High (A1F)

ARI (year)	AEP (%)	10 min	20 min	30 min	1 hr	2 hr	6 hr	12 hr	24 hr	48 hr	72 hr
2	50%	26.7	40.4	49.9	66.1	83.0	126.1	143.4	155.8	177.4	192.0
5	20%	34.5	53.1	63.5	85.4	108.9	173.4	202.3	221.9	253.4	273.0
10	10%	33.7	61.7	72.8	98.9	126.9	206.3	243.7	270.7	309.8	334.5
20	5%	44.7	70.3	81.6	111.7	144.8	241.7	286.6	320.6	367.7	396.6
50	2%	51.2	80.8	93.4	128.8	167.3	285.0	340.9	384.0	441.4	477.3
75	1.3%	54.0	85.4	98.2	135.7	176.4	301.8	361.7	407.7	468.3	506.1
100	1%	56.0	88.7	101.7	140.6	182.8	313.7	376.3	424.5	487.3	526.5

This figure shows the depth of rainfall and expected for the present day (blue line) and selected future timeframe and emission scenario(s) (red line) for a selected rainfall duration and location in Kiribati (on the Y-axis), for a range of different average recurrence intervals (from 2 to 100 years or 50% to 1% Annual Exceedance Probability, AEP) along the X-axis. The scale on the x-axis is logarithmic.



Seawall (revetment) slope (1 in x):

Seawall crest width:

Seawall (revetment) armouring:

Revetment crest wall:

**Plot description**  
 This figure shows how the mean annual overtopping of seawall structures will change due to climate change. The dark green bar shows the mean overtopping rate for the present day with the light green bar showing the equivalent overtopping level for the selected future timeframe and emission scenario. The mean overtopping rate is the maximum value for all usage and water level/pair combinations, for the 10% annual

**Results: Ocean shoreline**

Timeframe: Tiba-tora (2036-2060)      Baseline (present) year: 1980-1999 average (IPCC)  
 Emission Scenario: A1F (high)      Sea-level rise magnitude: 0.35 m

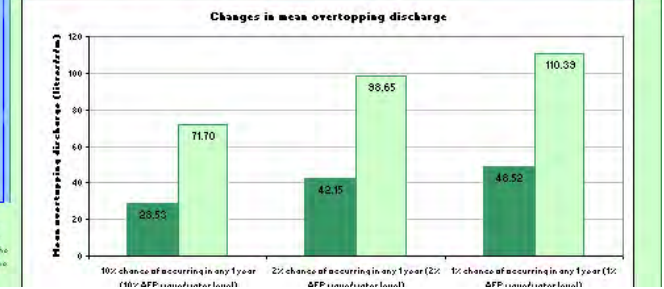
Select results to show:

Compare to overtopping safe limits for:

**Changes in mean overtopping discharge**  
 Results in litres per second per metre of seawall

Chance of occurring in any one year:	Present day	Tiba-tora (2036-2060)	% increase
10% chance of occurring in any one year:	28.53	71.70	151.3%
2% chance of occurring in any one year:	42.15	98.65	134.0%
1% chance of occurring in any one year:	48.52	110.39	127.5%

Ocean shoreline: Changes in mean overtopping discharge  
 Minimum values from all joint probability combinations



# Socio-economic vulnerability assessment

- Develop an understanding of the communities or elements within communities that are more susceptible to climate-related risks and how these vulnerabilities may change over time.
- Develop an understanding of the underlying causes of community vulnerability and establish the relative significance of rainfall, inundation and other climate risk-related vulnerability within this wider community vulnerability context.
- Reduce barriers to inter-generational adaptation planning
- Contribute to helping empower community leaders to develop effective risk reduction and adaptation options and strategies
- Ensure that identified adaptation options can be effectively implemented and that they do not exacerbate vulnerabilities in any way.



# Outputs

- New drainage design guidelines
- Calculator tools to enable climate change impacts of extreme rainfall & coastal defence performance to be assessed
- Technical reports
- Indicative river & coastal inundation maps
- Options assessment and appraisal including socio-economic inputs
- Increased capacity with LAWARM to apply the process in other locations.

# Introduction to the Project team



**Land and Water Resource  
Management Division**



# Vinaka vakalevu