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Climate Change in Niue

Dewi G.C. Kirono, Roger N Jones*, Janice M Bathols
CSIRO Marine and Atmospheric Research, CAWR, Victoria, Australia

Introduction

Niue, home to about 1,600 inhabitants, is a tropical island located in the Pacific and is one of the world's largest emerged coral atolls with an area of 260 km². It is susceptible to sea level rise and natural hazards such as tropical cyclone. Fishing and tourism dominate the private sector in Niue and these sectors are vulnerable to changes in climate.

This paper describes climate change and its potential consequences to selected sectors within Niue. Present climate variability was analysed based on observed data, while the regional climate projections were developed based on an analysis of global climate model (GCM) simulations.



Observed climate variability

Overall there is no large trend in any climate variable in Niue. Over the last 50 years:

- the mean annual temperature has risen by ~ 0.02 °C per year
- dry season (May-Oct) and wet season (Nov-Apr) rainfall has changed at a rate of +1.9 and -1.7 mm per year, respectively.

Niue's rainfall has a close relationship with ENSO and the relationship is modulated by the IPO.

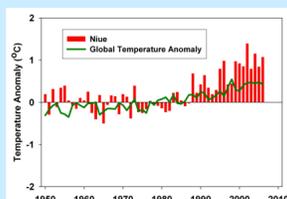


Figure 1: Niue and global-mean air temperature anomalies from 1950 to 2006, relative to the average for 1961-1990.

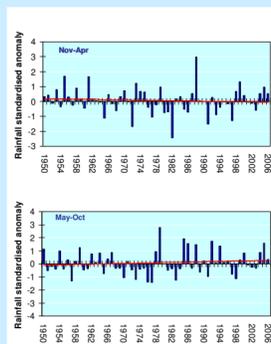


Figure 2: Seasonal rainfall anomalies, relative to the mean and standard deviation for 1961-1990. The red lines represent the linear trends.

Regional climate projection

Best estimate and ranges of projections of selected variables by 2050, relative to present climatology, for Niue are as follows:

Variables	Time	Best estimate (median)	Ranges of estimates (10 th to 90 th percentile)
Air temperature (°C)	May-Oct	+0.7 to +1.5	+0.6 to +1.6
	Nov-Apr	+0.7 to +1.5	+0.6 to +1.7
Rainfall (%)	May-Oct	-1.4 to -3.2	-12.2 to +4.8
	Nov-Apr	+0.5 to 1.1	-8.6 to +12.1
Extreme rainfall (%)	Dec-Feb	+3.4 to +7.7	-8.9 to +47.4
	Mar-May	+6.4 to +14.5	-12.1 to +51.8
	Jun-Aug	+4.4 to +9.7	-20.4 to +35.8
	Sep-Nov	+0.3 to +0.8	-16.2 to +22.7
Solar radiation (%)	May-Oct	0 to +0.1	-1.3 to 1.6
	Nov-Apr	-0.2 to -0.5	-1.9 to +1.6
Wind speed (%)	May-Oct	+2.9 to +6.7	+3.1 to +9.8
	Nov-Apr	+0.4 to +0.9	-9.0 to +6.0

Potential impacts on selected sectors

Sector	Changes	Implications
General aspect 	<ul style="list-style-type: none"> • Increase in extreme rainfall • Increase in tropical cyclone intensity, and mean sea level rise 	<ul style="list-style-type: none"> • Increase erosion • Storm surges and large waves causing coastal inundation and erosion, and coast retreat
Water resources 	<ul style="list-style-type: none"> • Decrease in dry season rainfall • Increase in wind speed and temperature intensify potential evapotranspiration 	<ul style="list-style-type: none"> • Groundwater recharge may be lessened • Depletion in quantity and quality of the groundwater
Agriculture 	<ul style="list-style-type: none"> • Decreases in rainfall and increases in evapotranspiration • Increase in wind speed 	<ul style="list-style-type: none"> • Decrease in taro production • Potential increase in wind erosion reducing size of land suitable for agriculture
Fishing 	<ul style="list-style-type: none"> • Increase in temperature • Changes in ENSO, changes of water current patterns 	<ul style="list-style-type: none"> • Artisanal fisheries may decline due to increase in coral bleaching episodes, and increased risks of ciguatera poisoning caused by disturbance to the reefs • The availability and seasonality of deep water fish may change
Tourism 	<ul style="list-style-type: none"> • Tropical cyclone frequency not change but its intensity may change • Increase in air and sea surface temperatures 	<ul style="list-style-type: none"> • Less safety • Proliferate certain organisms (e.g. mosquitoes and mussels) and pose a health threat



References

Kirono, D.G.C., Jones, R.N. and Bathols, J.M. 2008. *Climate Change in Niue*, A report prepared for the Government of Niue

Roger Jones* current affiliation is the Centre for Strategic Economic Studies, Victoria University, Melbourne, Australia

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Further information

contact: Dewi Kirono
phone: (03) 9239 4651 0000
email: dewi.kirono@csiro.au
web: www.cmar.csiro.au

www.csiro.au