

## Impact of climate change on spirituality

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### Abstract

The Pacific is known as the most sensitive region to the impact of climate change on spirituality due to high Christian rates per capita. Using an explanatory design, here we studied 36 cases ( $n=36$ ) of Fijians aged 25 to 55+ from 17 communities in Vitilevu, Fiji, and found that 50% (18) were affected, with which 22.2% (8) were negatively affected, 11.1% (4) were neither affected and 16.6% (6) were positively affected. A chi-square goodness-of-fit test shows that these differences were statistically significant:  $\chi^2(5) = 29.000, p < 0.01$ . A Kendall's tau-b shows, there is a strong positive correlation between climate change and impact on spirituality ( $\tau_b = .747, p < 0.01$ ). The same factors were explored qualitatively using an in-depth interview ( $n=3$ ) and informant interview ( $n=1$ ) and found spirituality to affect negatively and positively. These results inform further research and policy on the spiritual dimension of adaptation to climate change.

**Keywords:** spiritual well-being; religion, environmental care, climate change, impacts, Pacific

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## Introduction

Pacific health and well-being impacts are linked inextricably to climate change (WHO, 2015; Havea et al., 2018b). Despite the growing level of interest in the health and well-being effects of climate change (Patz et al., 2005; Luber & Hess, 2007; Yao-Dong et al., 2013; Spickett, Katscherian, & McIver, 2013; Stanke et al., 2013 Jun 5; Semenza, 2014; Vins et al., 2015; WHO, 2015; McIver, 2016; McIver et al., 2016; Havea, Hemstock, & Jacot Des Combes, 2017; Havea, Hemstock, & Jacot Des Combes, 2018a), the relationship between climate change and spirituality has received little attention in research or policy. As a result of this deficiency in the literature (Nastasi et al., 2007), it suggested that there is little inherent to religious ideation or spiritual ideologies that predisposes people to relate climate change impacts to religion and/or spiritual well-being. But in reality, the finding would encourage implications that may change innovation in Climate Change Adaptation (CCA) and/or Disaster Risk Reduction (DRR), globally.

In climate change and/or hazards management, this is a very significant epistemological modality because it has implications for the development of better adaptation solutions for the people in the region. And, since the Pacific is known as the most at risk region to be affected by climate change and disasters caused by natural hazards in the world (Bündnis Entwicklung Hilft, 2017), and because it has the highest rate of Christianity per capita worldwide (Fiji Islands Bureau of Statistics, 2008; Tonga Department of Statistic, 2011; 'Ata'ata, 2012; Tonga Department of Statistic, 2013a; b; Ernst & Anisi, 2016), it is opportune to use this current study to redress this deficiency in literature.

Studying to understand the spiritual values and traditions of the people in the Pacific is vital for various reasons. First, to help in building the capacity for spiritual adaptation in the region. Second, it will open up new windows of opportunity to learn, how to use the power of Jesus Christ their Lord and Saviour from the Bible (Bible Society of the South Pacific, 1966; The Bible Society in Australia, 1988) to reverse this negative impact on spirituality, one way or another.

This is significant for Fiji and the Pacific because evidence in Fiji suggested that it has assisted people in developing the local adaptation to climate change, through fasting and praying to their Christian God (Gansle, 2007; Howells, 2010; Leiserowitz et al., 2015; Havea et al., 2017; Havea et al., 2018c). Not only did it help the communities to reverse these negative impacts of climate change on people's spirituality, but it also helped them recover the associated life indicators such as livelihoods, health and other dimensions of their overall well-being and happiness as well (Havea et al., 2018b).

In the Pacific, many people have already used the power of religion, their faith in their Christian God and spiritual life, to serve as protective factors against various negative impacts from rising sea level, tropical cyclones, tsunamis and earthquakes in their lives. From what is known there appear to have been cases where in the form of longer-term committed or fervent praying and fasting to their Christian God has reversed these negative impacts and influenced their lives, positively (Havea et al., 2018c). For instance, in Fiji on the island of Totoya in 2016, through the impact of climate change on the people's spirituality in this island, they have engaged in a chain-prayer since 2014, and through their prayers, fasting and faith in their Christian God, a miracle happened their land has been restored and healed, the trees on the island has been bearing fruits and plenty of seafood and fishes on the shoreline and its ocean territory (Nailalakai, 2016).

So, using Fiji as a pilot testing area, we studied 17 communities in Vitilevu: Lami, Kiuva, Vatuwaqa, Wailoku, Samabula, Vaturua, Nabua, Naganivatu, Kasavu, Tacirua East, Raiwaqa, Tamavua, Suvavou, Kinoya, Vatoa, Tovata and Laqere – Fiji (Fig. 1). The aim of this study was to provide a better understanding of the impact of climate change amongst Fijians aged 25 to 55+ spirituality.



**Figure 1** The map of the studied communities in Suva, Lami, Nasinu, Nausori, in Vitilevu, Fiji

## Methodology

### *Study sample*

The study design used an explanatory design of 36 Fijians aged 25-55+ from 17 communities in Vitilevu, Fiji. We called it an explanatory design because we relied heavily on the quantitative aspect of the study. Information on the impact of climate change on spirituality was collected via self-administered questionnaires (n=36), individual in-depth interview (n=3) and informant interview (n=1). Because there was no funding and the timing was limited, the study used a random sampling framework named census block householding (Fiji Islands Bureau of Statistics, 2008) and respondent-driven sampling (Heckathorn, 2011) to select participants for this study.

### *Data analysis*

Our analytic strategy used an explanatory design. For the quantitative data, first, we did a frequency analysis to calculate the frequency counts. Then, we conducted a chi-square goodness-of-fit test to show whether the differences between the negative and positive impact of climate change on people spirituality were statistically significant. Finally, we then performed a correlation test using Kendall's Tau-b to assess the relationship between climate change impacting on people spiritual well-being and adaptation strategies in their communities (Miles & Huberman, 1994; Creswell, 2013; Miles, Huberman, & Saldaña, 2014; Creswell, 2014).

Once we get the results for the quantitative study, we then used a thematic analytical approach to explore the qualitative data by taking one pieces of data (one theme) and comparing it with the survey data that may be of similar or different, to develop a conceptualization of those whose perceived spirituality were affected and those who were not. Data analysis was carried out with the use of SPSS, R, Nvivo and QGIS for mapping.

## Results

### *Study population: gender, age group and locations*

The study recruited more men (69.4%) than women (30.6%) between the aged 25 to more than 55 years old from 17 communities around Suva, Lami, Nasinu and Nausori areas in the central division in Vitilevu, Fiji (Fiji Islands Bureau of Statistics, 2008) (Table 1).

**Table 1** Age group by gender and location

Gender			Age-group				Total		
			25-34	35-44	45-54	55+			
Male	Location	Lami	0	0	0	1	1		
		Kiuva	0	1	0	0	1		
		Vatuwaqa	0	1	0	4	5		
		Wailoku	0	2	1	0	3		
		Samabula	0	0	2	0	2		
		Vaturua	1	0	0	0	1		
		Nabua	0	0	0	1	1		
		Naganivatu	0	1	0	0	1		
		Tacirua East	0	2	0	0	2		
		Raiwaqa	1	0	0	1	2		
		Tamavua	0	0	1	0	1		
		Suvavou	1	0	0	1	2		
		Kinoya	1	0	0	0	1		
		Vatoa	0	1	0	0	1		
		Laqere	0	0	1	0	1		
			<i>Sub-total</i>		4	8	5	8	25
		Female	Location	Lami	2	0	0	0	2
Kiuva	1			0	0	0	1		
Vatuwaqa	1			1	1	1	4		
Nabua	1			0	0	0	1		
Kasavu	1			0	0	0	1		
Suvavou	0			1	0	0	1		
Tovata	1			0	0	0	1		
<i>Sub-total</i>				7	2	1	1	11	
	<b>Total</b>		<b>11</b>	<b>10</b>	<b>6</b>	<b>9</b>	<b>36</b>		

N=36, Missing=0

This statistic is not proportioned with the total male (50%) and female (50%) population of Suva, Lami, Nasinu and Nausori (N=241,270) (Fiji Islands Bureau of Statistics, 2008) because we were recruited more men than women. However, it still represents a good sample of all iTeukei (indigenous Fijian) residents in Fiji.

### Impact of climate on spirituality

Of the 36 participants recruited to participate in the study, whilst 50% (18) reported that their spirituality had been affected, 50% (18) reported that their spirituality was not affected, regardless of their religion, whether Christianity or not (Table 2). This is expected in a country like Fiji because not only that it is a multi-racial and multi-cultural nation governed under a secularism state (Government of Fiji, 2013) but still 64.9% of its total population lingers into their faith as Christians (Fiji Bureau of Statistics, 2007; Fiji Islands Bureau of Statistics, 2008).

**Table 2** Climate change affected spirituality negatively by Christianity and gender

Gender			Christianity		Total
			Yes	No	
Male	Climate change affects	No	13	0	13
	spiritual well-being negatively	Yes	10	2	12
	Sub-total		23	2	25
Female	Climate change affects	No	5	0	5
	spiritual well-being negatively	Yes	6	0	6
	Sub-total		11	0	11
Total	Climate change affects	No	18	0	18
	spiritual well-being negatively	Yes	16	2	18
	Total		34	2	36

N=36, Missing=0

### Chi-square goodness-of-fit test for the negative and positive impact of climate change on spirituality

Further, to the cross-tabulation analysis above, a chi-square goodness-of-fit test (Balakrishnan, Voinov, & Nikulin, 2013; Sulaimon, Olutayo, & Timothy, 2016) was conducted on how climate change affected spirituality negatively and positively in a 6-point scale and whether they differed significantly, or not. Based on this sample, the result shows that these differences were statistically significance:  $\chi^2(5) = 29.000, p < 0.01$  (Table 3).

**Table 3** Chi-square goodness-of-fit test for the negative and positive impact of climatechange on spirituality

	Observed N	Expected N	Residual
Not at all affecting my spirituality	18	6.0	12.0
Strongly Negative	4	6.0	-2.0
Negatively	4	6.0	-2.0
Neither	4	6.0	-2.0
Positively	3	6.0	-3.0
Strongly positive	3	6.0	-3.0
Total	36		

**Test Statistics**

How likely do you think that climate change has affected your spiritual well-being?

Chi-Square	29.000 <sup>a</sup>
df	5
Asymp. Sig.	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 6.0.

As indicated by a Pastor from the Christian Outreach Centre Church in Suva, that climate change has affected him and his family negatively in the sense that: “It makes me unhappy, stress and anxiety. Especially when climate change affected something emotional like destroying our buildings, house, agriculture etc. When it killed people too. It affected my spiritual well-being.” The same negative impact on spirituality that reported by Nailalakai newspaper in May, 2016 claiming the impact on the island of Totoya was astounding by saying that: “The villagers were very worried and stressed out because they can’t do anything now, and the coastal erosion is reaching out to the first house in the village, which is the pastor’s house and the village hall. This is where the coastal erosion was happening due to rising sea level and waves that were coming inland.” (Nailalakai, 2016).

In a statement from Pastor Semi Masau, who looked after the Methodist church in the Dravuwalu village of the island of Totoya, as his house was next to the middle of the sea, he said: “that when the effects of climate change became evident, they began to see changes such as the slowly washing away of sand from the beach. This is the evidence. There was so much sand being washed away by the sea and its closes now to where I lived. As a result, the villagers, then, agreed in a village meeting to relocate my house and the village hall, as it was right next to the sea. But before we did that, they decided to engage in a nonstop chain-prayer for a straight period of two years” (Nailalakai, 2016).

And like the people in the island of Totoya, because there was no one else to turn to in times of hardship and need, other than worshipping their Christian God, the positive impact of climate change on spirituality is that it makes people faith in their God stronger. As stated by a female indigenous spiritual leader in the study: “It makes me stronger in my belief knowing that the God that I served will look after me and my family and all my relatives, as we all survived the category 5 cyclone Winston.”

The same positive impact reported by Pastor Semi from Totoya. He said: “At the beginning of involving ourselves in this chain-prayer, the first revelation that was shown to us was the continuous ripening of pawpaw and breadfruit. These fruit trees continued to spring out fruits and then we have no shortages of food on the island with a wealth of seafood from the sea. Fish and crabs of all sorts on our beaches were becoming plentiful and abundance. And, as we continued with our chain-prayers, we were shocked to find out that the sea began bringing back the sand to bury our beach as well.”

He continued: “During this time, the villagers thought there will be no other strength on this earth to revert this. Only their one and only true God, Jehovah could. And they were shocked with amazement, when they saw a miracle, that the sand began burying their beach. The miraculous thing happened, is that the places that washed away by waves due to climate change as experienced all over the world are now being restored. As the sea waves came inland, they brought sand with them, burying our beach until all areas were reclaimed, just like before. Till today, the villagers are not worried anymore, not even the Pastor’s house or their village hall as it is God’s will” (Nailalakai, 2016).

Interestingly, a female participant from the Pacific Conference of Churches (PCC) elaborate further on the issue and indicated that the other negative impact of climate change on perceived spirituality is that not only as a “punishment for their sin”, “signs of the last days” is near as predicted in the book of revelation in the Bible (Bible Society of the South Pacific, 1966; The Bible Society in Australia, 1988; Gansle, 2007; Howells, 2010) but “cyclone itself is like a God’s spirit that it has eyes and seems to know exactly how to choose specifically the village or islands or things to destroy, damage or attack.” These perceptions, however, are in parallel with what Christians in Tonga has been perceived (Havea et al., 2018b).

## Kendall's tau b on the impact of climate change and adaptation strategies on spirituality

To ascertain the relationship between climate change impacts and its impact on spirituality, a correlation test named Kendall's tau-b (Abdi, 2007) was performed to calculate the correlation value between these two variables. The study found that there is a strong correlation between climate change and affecting people's spiritual well-being ( $\tau_b = 0.747, p < 0.01$ ) (Table 4).

**Table 4** Correlation of impact on spirituality and adaptation strategies

	Q1	Q2	Q4d	Q4i	Q4j	Q4k	Q4l	Q4m	Q4n	Q4p
Q1	----	<b>.747**</b>	-.060	-.167	-.056	-.112	.000	-.181	.000	-.056
Q2	<b>.747**</b>	----	.031	-.217	-.199	-.263	.146	-.119	.096	-.233
Q4d	-.060	.031	----	<b>.507**</b>	<b>.580**</b>	<b>.472**</b>	<b>.663**</b>	<b>.738**</b>	<b>.584**</b>	<b>.438**</b>
Q4i	-.167	-.217	<b>.507**</b>	----	<b>.672**</b>	<b>.722**</b>	<b>.501**</b>	<b>.627**</b>	<b>.526**</b>	<b>.442**</b>
Q4j	-.056	-.199	<b>.580**</b>	<b>.672**</b>	----	<b>.622**</b>	<b>.501**</b>	<b>.701**</b>	<b>.501</b>	<b>.799**</b>
Q4k	-.112	-.263	<b>.472**</b>	<b>.722**</b>	<b>.622**</b>	----	<b>.335**</b>	<b>.593**</b>	<b>.369**</b>	<b>.605**</b>
Q4l	.000	.146	<b>.663**</b>	<b>.501**</b>	<b>.501**</b>	<b>.335**</b>	----	<b>.663**</b>	<b>.570**</b>	<b>.394**</b>
Q4m	-.181	-.119	<b>.738**</b>	<b>.627**</b>	<b>.701**</b>	<b>.593**</b>	<b>.663**</b>	----	<b>.708**</b>	<b>.561**</b>
Q4n	.000	.096	<b>.584**</b>	<b>.526**</b>	<b>.501**</b>	<b>.369**</b>	<b>.570**</b>	<b>.708**</b>	----	<b>.327</b>
Q4p	-.056	-.233	<b>.438**</b>	<b>.442**</b>	<b>.799**</b>	<b>.605**</b>	<b>.394**</b>	<b>.561**</b>	<b>.327</b>	----

\*P<0.05, \*\*P<0.01.

- Q1 – Does climate change affect your spiritual well-being/ spirituality negatively?**  
**Q2 – How likely do you think that climate change has affected your spiritual well-being?**  
**Q4d – By going to church to sing to God and praise him by singing**  
**Q4i – Reading the bible, holy scripture, and living in peace with one another at homes/communities and at all levels**  
**Q4j – Keeping myself healthy and happy**  
**Q4k – Accepting Jesus Christ as my savior only then my spirituality will be happy and find peace with my inner being**  
**Q4l – Giving scholarship for students to study spirituality and its relation to climate change at higher education (e.g. Masters)**  
**Q4m – Developing a spirituality and resilience curriculum**  
**Q4n – By improving capacity-building for community-based adaptation program**  
**Q4p – By working together with the indigenous spiritual leader to find a way to heal the land (i.e. Vanua) that are affected**

Most importantly, the study found that improving people spirituality were attributed to eight factors such as:

- 1) By going to church to sing to God and praise him by singing ( $\tau_b = 0.738, p < 0.01$ );
- 2) Reading the Bible, holy scripture, and living in peace with one another at homes/communities and at all levels ( $\tau_b = 0.722, p < 0.01$ );
- 3) Keeping myself healthy and happy ( $\tau_b = 0.701$  &  $0.799, p < 0.01$ );
- 4) Accepting Jesus Christ as my saviour only then my spirituality will be happy and find peace with my inner being ( $\tau_b = 0.722, p < 0.01$ );
- 5) Giving scholarship for students to study spirituality and its relation to climate change in higher education (e.g. Masters, Ph.D.), ( $\tau_b = 0.663, p < 0.01$ );
- 6) Developing a spirituality and resilience curriculum ( $\tau_b = 0.738, 0.701$  &  $0.708, p < 0.01$ );
- 7) By improving capacity-building for community-based adaptation program ( $\tau_b = 0.708, p < 0.01$ );
- 8) By working together with the indigenous spiritual leader to find a way to heal the land (i.e. Vanua) that are affected ( $\tau_b = 0.799, p < 0.01$ ).

## Discussion

Spirituality is derived from a Latin word spiritus (soul, courage, vigour, breathe) meaning spirit. In the Bible, in John 4:24, it says: "God is a Spirit: and they that worship him must worship him in spirit and in truth" (Bible Society of the South Pacific, 1966; The Bible Society in Australia, 1988). So, if God is a spirit, and thus

spirit is living within a person spiritual dimension or soul, then spirituality is an internal, personal and emotional expression of the sacred (e.g. good or bad soul/evil spirit) or state of a person connecting to God, which measured by spiritual well-being, religious participation/coping, happiness, peace or comfort based on one's faith (Koenig, McCullough, & Larson, 2001; Hill & Pargament, 2003; Koenig, King, & Carson, 2012). Spirituality is significant because it can be used to improve a person's health and well-being. In this study, we try to measure this and what we found is that spirituality can be affected in two forms: negatively and positively.

To begin with, since spirituality is expressed in the form of a person's soul (e.g. good or bad spirit and faith) and be measured in terms of religious involvement (e.g. frequency of church attendance and praying to God), spiritual containment (e.g. how spiritual are you?) and psychological state, we found that climate change was affected people in the study negatively in the forms of unhappiness, worriedness, stressed and anxiety (50%), regardless of their religions and the status of their Christianity.

This impact of climate change in the Pacific is especially true on all occasions. When climate change destroyed something that is livelihood-health-wellbeing-based, like the building environment, food and water security and blamed to be the cause of death, it has impacted on people lives and spiritual well-being, negatively. For example, a female participant from PCC stated that "in the case of TC Winston in Fiji there were 44 altogether", who was killed, had devastated families, relatives and friends. So, feeling unhappiness, worriedness, stressed out and anxiety amid and an after-effect of the impact of climate change is a common posttraumatic stress, depression and anxiety disorder. As a result, a pre-during-post-spiritual adaptation plan, is, therefore, needed for the people of Fiji.

Secondly, the perceptions that climate change is a form of "punishment for their sins" from God is prominent in the region (Havea, 2014; Liava'a, 2017; Cox et al., 2018). For example, a female participant from PCC stated that "Lomaiviti province were mostly affected by TC Winston in 2016 because most Sundays, they were no longer going to church, as most would spend time creating Fijian worldly music that most people from that province were well known for." This kind of perception implied why some of the areas were affected while others were not, because people perceived cyclone to be an evil spirit, it has eyes, and send by God, so they knew which areas and/or houses to be destroyed and alike. But, because they fear God, they tend to double their efforts to please him for forgiveness through climate change adaptation (CCA).

Such efforts may include but are not limited to reading their Bible, praying and fasting more often to their Christian God to reverse these impacts ( $\tau_b = 0.722$ ,  $p < 0.01$ ) and accepting Jesus Christ as their Lord and saviour ( $\tau_b = 0.722$ ,  $p < 0.01$ ). As a result, in the veracity of this negative perception that God is punishing them, they turned it in the form of reverse adaptation to create happiness, strengthening their resilience, peace and comfort, as part of God's will and plan through praying and fasting. A reverse process from punishment to atonement, astonishment and blessedness. However, there is a variation of faith in this system of belief amongst different denominations and non-Christian religions because they have different biblical-theological positions on climate change and repond differently to the issue (Havea, 2014; Liava'a, 2017).

Further to "the punishment for sinning like the stories shared above, the God of the new testament is accepting this, as all part of God's End Times prophecies through Paul in the book of Revelation or what they called "End of Times Fanatics" Christian (Havea, 2014; Liava'a, 2017). Sometimes this belief system makes people reactive to such events than proactive, as this natural hazard is all part of God's plan", as explained by the participant from PCC. Indicated that climate change, as a sign of the last days and/or approach of the judgement day, came out strongly. For those affected intensively including the families of the casualties, this sign of the second coming of Jesus Christ their Lord and saviour impacted them positively. Such impact may include keeping themselves healthy and happy ( $\tau_b = 0.701$  &  $0.799$ ,  $p < 0.01$ ) by praying, cleaning the environment, reforestation inter alia, as Jesus can come anytime he wants (e.g. tomorrow, next year or 2000 years from now).



Moreover, we found that the more damages that climate change and disasters did to people lives ( $\tau_b = 0.747$ ,  $p < 0.01$ ), the stronger their faith is in their Christian God for safety and protection is ( $\tau_b = 0.722$ ,  $p < 0.01$ ). As a result, the theologian could use the teachings from the Bible to influence them positively, thus preparing them for future impacts. As stated by a female participant from PCC: “It is often more towards, with what God has given us, how do we get our communities prepared and be able to sustain ourselves” to fight climate change. “At the same time, people could see their responsibility in planning and prepare well (pre, during and post), as a way God gave them the ability to withstand and/or grow together, as a resilient community. For example, “Early warning signs or weather updates are like warnings from God, given them enough time and proper planning, that their communities should be able to coordinate themselves and secure their villages”, accordingly.

Adding to the above state of affairs, people who were affected also have a strong spiritual connection to their land (or Vanua) (Liava'a, 2017), thus allowing them to be closer to their God through prayer and fasting, asking for forgiveness and to heal their land. For example, those who were affected found themselves to be more healthy and happier if they will be working together to find a way to heal their land ( $\tau_b = 0.799$ ,  $p < 0.01$ ). As indicated by the Minister from Totoya, “they have engaged in chain-prayer” for two years, “and through their prayers, fasting and faith in their Christian God, their land has been healed, the trees on the island have been bearing fruits and plenty of seafood and fishes on the ocean” (Nailalakai, 2016).

In a final point, people whose spiritual well-being were affected tend to use the power of Jesus to reverse this impact either by praying, reading their Bible ( $\tau_b = 0.722$ ,  $p < 0.01$ ), go to Church or fasting to their Christian God ( $\tau_b = 0.738$ ,  $p < 0.01$ ), in order to help them live with a peaceful life despite the difficulties they have faced with in life. As highlighted by Pastor Semi Masau of Totoya, nothing is impossible to their God because “During this time, the villagers thought there will be no other strength on this earth”, but “their one and only true God Almighty, Jehovah” can reverse it. As “They were shocked with amazement, when they saw a miracle, that the sand began burying their beach” (Nailalakai, 2016) in 2016.

Our study features some limitations. First, because there was no funding to support this study, we were not able to model the process of how climate change affected spirituality negatively and positively. Second, the data collected on this study was limited. However, we did make an effort to collect enough information regarding the impact of climate change on spirituality.

In conclusion, there are three main lessons learnt from this paper. First, is that climate change has affected people spiritual well-being negatively and positively. Second, is that there is power in using spirituality to complement science in adapting to climate change. Third, the Christian God is the only one God who can reverse the impacts of climate change. For the future, further studies are still needed, to understand the linked of climate change, spirituality to God and how to use God's power to heal any nation. To date, no one can fathom that. Once this state-of-the-art idea understood, a revolution in climate services and resilience (CCA & DRR) in Fiji and the Pacific will prevail, contributing to building resilient Pacific Islanders, by 2030 and beyond.

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### Authors' biographies

**Peni Hausia Havea** is a finishing PhD candidate in climate change from the University of the South Pacific who holds a Master degree in Public Health majoring in International Health from the University of Melbourne, Australia. His PhD thesis is looking at “Climate Change Impact on Livelihood, Health and Well-being: A Mixed Method Approach”.

**Sarah L. Hemstock** holds a PhD in bioenergy systems modelling from King's College London and is an author and adviser to the Alofa Tuvalu “Small Is Beautiful” project—recognised by UNESCO as one of its “Decade of Achievement Projects”. She authored and led the €6 million European Union Pacific Technical Vocational Education and Training on Sustainable Energy and Climate Change Adaptation Project (EU PacTVET) at the Pacific Community (SPC). She was a Visiting Fellow at Nottingham Trent University is now an Adjunct Fellow of the University of the South Pacific where she led the €8 million Global Climate Change Alliance Project. Her interest in the Pacific region began while lecturing at King's College London & as a consultant for Imperial College when she researched biomass resources in several Pacific small island developing states. Sarah is a founder of the Pacific Regional Federation of Resilience Professionals and was a member of the EU Intra-ACP Global Climate Change Alliance Steering Committee; and numerous international project steering committees. In 2010 she was made Government of Tuvalu Honorary Ambassador—Officer for Environmental Science. She is now Programme Leader for Geography at Bishop Grosseteste University in UK.

**Helene Jacot Des Combes** obtained her PhD on “reconstruction of the paleoceanography and paleoproductivity variations in the NW Indian Ocean during the last 300 kyr: the geochemical response compared to the biological record”, at the University of Lille, France, in 1998. From 2000 to 2008, she worked as a scientist at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany. She joined PaCE-SD as a Research Fellow. She was a lecturer under the USP-EU-GCCA project and then a Senior Lecturer in Climate Change Adaptation at USP. She participated in the development of a TVET training program and associated resources on Resilience (Climate Change Adaptation and Disaster Risk Reduction) in 15 Pacific island countries under the 6 million Euro European Union Pacific Technical Vocational Education and Training on Sustainable Energy and Climate Change Adaptation Project (EU PacTVET). She was also the Course Coordinator for the Postgraduate Diploma course on disaster risk reduction. Dr Helene is currently the Disaster Risk Management & Climate Change Adaptation Advisor for the Government of Marshall Island under the World Bank funded PREP project.

**Johannes M. Luetz** (BA/USA, MBA/Germany, Ph.D/Australia) is Senior Lecturer, Postgraduate Coordinator and Research Chair at CHC, a bespoke private higher education provider in Brisbane, and Adjunct Academic at UNSW Sydney in the School of Social Sciences, where he also earned his Ph.D. in Environmental Policy and Management with a thesis on forced human migration. Dr. Luetz has travelled and consulted extensively for World Vision International on research projects raising awareness of the growing effects of climate change on vulnerable communities in Asia, Africa and Latin America, and the need to meaningfully address vulnerabilities through praxis-informed approaches that work in the real world. Before joining the CHC Faculty he was a Lecturer in Development Studies at UNSW Sydney. He was raised in West Africa and Switzerland, cares deeply about poverty reduction, holistic education, justice and equity, and has researched, written and published conceptually and empirically in these areas. He is a big picture thinker and has interdisciplinary research interests at the science-policy interface, including in areas of leadership development, disaster risk reduction, human resilience, the not-for-profit sector, globalisation, sustainability, ecotheology and social transformation, among others. He heads the “Master of Social Science Leadership” program at CHC, which through its research and teaching activities on change leadership seeks to give rise to comprehensive social transformation.

**Laiseni F. C. Liava'a** is a Tongan priest of the Anglican Diocese of Polynesia. He is currently a PhD research candidate in Pacific Studies (Climate change, churches & women), University of Canterbury and a postgraduate student at The College of St Johns the Evangelist, Auckland, New Zealand. Prior to this Laiseni was a Tongan navy officer. He has worked in various positions, both in the public and private sector in Tonga. He holds a BD (Hons), MBA, MAppTheo, PostgradCert.Chp. and other credentials in administration and management. His recent research has been focused on climate change and churches in the Pacific.

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