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Climate Change in Pacific Island Countries:

A Review

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Abstract

This review investigates the climate change problem at a global level, specifically temperature limits and how much carbon we can burn globally to avoid reaching a point at which global temperature increase cannot be stopped by further human action due to ecological feed-back effects (such as polar ice melting and permafrost areas releasing methane). The Pacific Region is discussed in the global context, particularly the Pacific involvement in setting temperature limits and the specific vulnerabilities of the island nations. A review is given of the Pacific Island Countries Second National Communications (SNCs) and the Initial Nationally Determined Contribution or INDCs submitted to the Paris Agreement. It is concluded that the position of the Pacific nations is becoming more fragile every year with serious problems ahead.

Introduction

As Volker Boege notes[1] in his introductory policy brief Climate Change and Conflict in Oceania, "It is generally acknowledged that islands and coastal regions will be severely impacted by climate change. This holds true first and foremost for the Pacific Island Countries (PIC). Many PICs are particularly vulnerable due to their extreme exposure and their rather constrained options for adaptation." That this is true has been consistently noted in IPCC literature from AR1 (1990) to AR5 (2014)[2]. This vulnerability led to the early formation of AOSIS, the Association of Small Island

[1] Boege V., "Climate Change and Conflict in Oceania Challenges, Responses, and Suggestions for a Policy-Relevant Research Agenda" Policy Brief 17 Toda Research Institute July 2018.

[2] The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 under the auspices of the United Nations Environment Programme and the World Meteorological Organization for the purpose of being the main scientific authority on climate change. It produces a set of Assessment Reports (ARs) around every seven years, the most recent of which was

States in 1990. This organisation functions primarily as an ad hoc lobby and a negotiating voice for small island developing States (SIDS) and includes the 14 island nations in the Pacific region that submit independent reports to the United Nations Framework Convention on Climate Change (UNFCCC) in terms of climate change reporting.

This report will start by looking at the climate change problem at a global level, specifically temperature limits and how much carbon we can burn globally to avoid reaching a point at which global temperature increase cannot be stopped by further human action due to ecological feedback effects (such as polar ice melting and permafrost areas releasing methane). The report will then discuss the Pacific Region and its involvement in setting temperature limits and its particular characteristics and vulnerabilities. The next topic will be a discussion of the difference between mitigation and adaptation and how this might apply to the Pacific nations and to the global situation. As part of the UNFCCC reporting process all national signatories to the original Convention are obliged to submit reports on their Green House Gasses (GHG) emissions, and their mitigation and adaptation options[3]. Most Pacific Island Countries have submitted their Second National Communication (SNC). For reference New Zealand has submitted its seventh National Communication (7NC). In addition, as part of the Paris agreement in 2015 all signatories were obliged to submit their Initial Nationally Determined Contribution or INDC. These INDCs have now become NDCs or Nationally Determined Contributions. These are then the national pledges to reduce GHG emissions. These contributions can be assessed at a global level at the Climate Action Tracker website but the smaller developing countries are not included[4]. A summary discussion of these reports is included. Finally, some conclusions are reached.

Until the Paris meeting in 2015 it had been generally accepted by the IPCC that two degrees of warming, post the industrial revolution, is the critical point to avoid in terms of catastrophic climate change effects on the environment. There were of course critiques of this limit with the veteran climate change campaigner Jim Hansen insisting that the world should limit the global temperature rise to below 1 degree of warming, or 350ppm of CO2 in the atmosphere (Hansen J., 2009)[5]. As the world average temperature increase moved upwards in the past decade and past 1 degree and with it the atmospheric CO2 content (presently around 410ppm), the 1.5-degree limit and below was essentially ignored in the 2014 AR5 document set. As Gao et al document[6]: "Nevertheless, the assessment conclusions drawn by the AR5 regarding the 2 °C global temperature target, as well as the scientific information required for decision-making (including emission budget, pathway, and technical choice) strengthened the scientific basis for this political consensus".

AR5 in 2014- 2015.

[3] Developing countries (Non-Annex I) national communications can be found at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-non-annex-i-parties/submitted-national-communications-from-non-annex-i-parties

[4] https://climateactiontracker.org/

[5] Hansen J., "Storms of my Grandchildren", Bloomsbury NY, 2009.

[6] Yun Gao, Xiang Gao and Xiaohua Zhang "The 2 °C Global Temperature Target and the Evolution of the Long-Term Goal of Addressing Climate Change—From the United Nations Framework Convention on Climate Change to the Paris Agreement", Engineering 3 (2017) 272–278.

This consensus was contested by AOSIS and its opening statement for the Paris 2015 COP. On the special difficulties that climate change would cause small island nations it stated that: "It is therefore critical that the Paris Agreement establish medium and long-term emission reduction pathways that are capable of delivering a limitation of temperature increases consistent with a below 1.5-degree temperature goal"[7]. In the final Paris Agreement documentation, this aspirational goal was recognised, despite some scientific evidence suggesting that such a goal was unrealistic. AOSIS had realised the difficulties of achieving such a limit and had for some years been pressing for a separate "Loss and Damage Agreement" within the UNFCCC framework to compensate for damage to SIDS incurred by higher temperature increases. AOSIS notes[8] that: "With storms and floods becoming more frequent and intense, and slow onset emergencies projected to exceed previous forecasts, the Loss and Damage proposal must necessarily feature in our outreach with partners at the UNFCCC meetings and elsewhere".

Since the Paris agreement the IPCC, together with the climate change modelling community, has been scrambling to ascertain the implications of reducing the temperature target from 2 degrees to 1.5 degrees. The result has led to some confusion within the scientific community with some groups suggesting that it would be possible to stay below 1.5 degrees and others saying that such a target could not be met. The temperature target is linked to the amount of GHGs emitted to the atmosphere, with the main GHG being CO2, methane being the next most important in terms of implied temperature increase, and the other gasses including N20 and HFCs following. In this respect it is the CO2 budget which is critical. The CO2 budget directly tells us how much fossil fuel we can burn (in terms of CO2 content) from a given date.

The IPCC AR5 reports gave a CO2 budget of around 900 Gt (a Giga tonne is one billion tonnes) including Forestry and Other Land Use or FOLU (RCP 2.6): from 2010 for a 66% probability of staying below 2 degrees. The 1.5-degree budget, inferred from later reports, are around 600 Gt, presumably also from 2010 and including FOLU with 66% probability. Emissions are (have been) around 40Gt p.a. including FOLU and so to 2020 we will have used around 400 Gt of the budget, giving us 5 years to go from 2020 before 1.5 degrees budget expires (2025) and 12 years before the 2 degrees budget expires (2032). Even if some of the rich countries (predominantly in Europe) decrease emissions appreciably, the time scale including all countries' emissions would not be extended too far. At present 2016-2017 emissions appear to be rising by around 1.6% p.a. (BP Statistics 2018)[9].

All the percentage probabilities (for success of achieving target budgets) are derived from computer simulation models, but a recent paper by Fisher et al "Comparison of paleo observations with

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[7] http://aosis.org/wp-content/uploads/2015/12/FINAL-AOSIS-COP-Statement-Paris-.pdf
[8] http://aosis.org/loss-damage/
[9] https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf

climate model results suggests that, due to the lack of certain feedback processes, model-based climate projections may underestimate long-term warming in response to future radiative forcing by as much as a factor of two, and thus may also underestimate centennial-to-millennial-scale sea-level rise" (Fisher et al 2018)[10]. Thus, we have an IPCC scenario where the probabilities for success are derived from models, which may be 100% uncertain. If the carbon budgets from modelling are 100% too high (i.e. they should be around 450Gt and 300Gt respectively) then we have gone past the 1.5-degree budget already and are very close to going past the 2-degree budget. On the other hand, other papers from recent modelling efforts are suggesting that considerably increased CO2 budgets might be allowed[11]. This apparent change in allowed carbon budget, from one of the world's top modelling teams, has left not just me scratching my head. Michael Le Page, from the UK magazine New Scientist noted that: "However, the results (of the Millar R.J. et al. paper) have left other researchers scratching their heads, says Gavin Schmidt, head of the NASA Goddard Centre for Space Studies in New York. "I can tell you that lots of people are emailing around trying to work out why these numbers are so much higher than previous ones."[12]

The allowed carbon budget thus may be either half that suggested in AR5 or possibly more than double. Why is all this important? Because if the 1.5-degree limit is likely to be breached then the vulnerability for the Pacific Island Nations increases considerably and the emphasis for these countries should move from mitigation to adaptation. The IPCC is currently trying to put together a consensus on the likelihood of a 1.5-degree target being reached with a report commissioned with this task in April 2016. A draft of this report has been leaked to the press (mid 2018), suggesting that the lower limit cannot be achieved. However, the IPCC has reminded us that the conclusions of this report are still being reviewed and that the draft cannot be relied on to be the same as the final report, which is due to be released around October 2018.

As can be seen from the above analysis the amount of carbon that we can burn is not a lot and if the AR5 estimate is used we only have 6 years of emissions at current levels from the end of 2018 before the 1.5-degree limit is broached. The global carbon budget is critical as it will affect the Pacific countries in ways that they are currently not considering, in particular, such a drastic cut in fossil fuels globally would essentially remove international tourism to these countries as a revenue earner! Before we consider these implications a review of the region in terms of the emissions and key climate change threats is needed.

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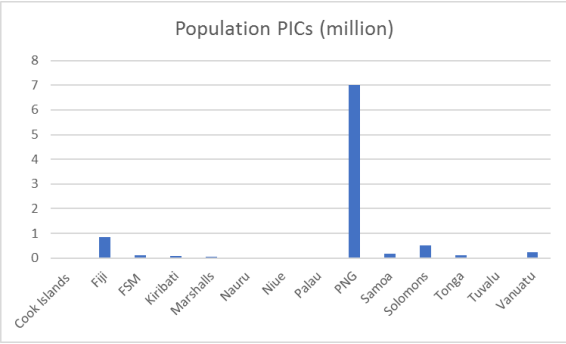
[10] Fisher et al "Paleoclimate constraints on the impact of 2 °C anthropogenic warming and beyond" Nature Geoscience, VOL 11 , JULY 2018, 474–485.

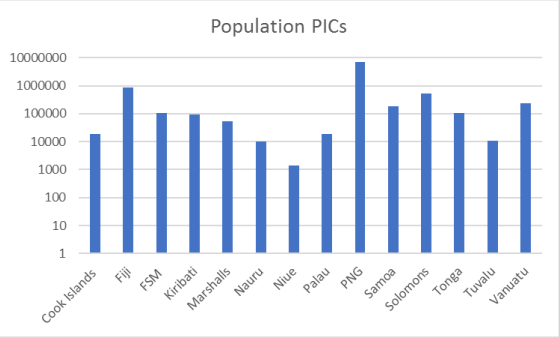
[11] Millar RJ. et al. "Emission budgets and pathways consistent with limiting warming to 1.5 C", Nature Geoscience, VOL 10, OCTOBER 2017.

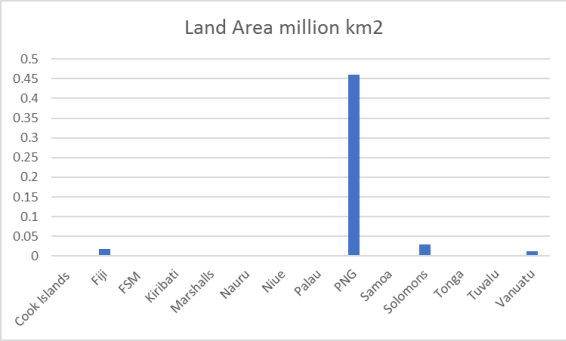
[12] Source: New Scientist 125, 23 September 2017.

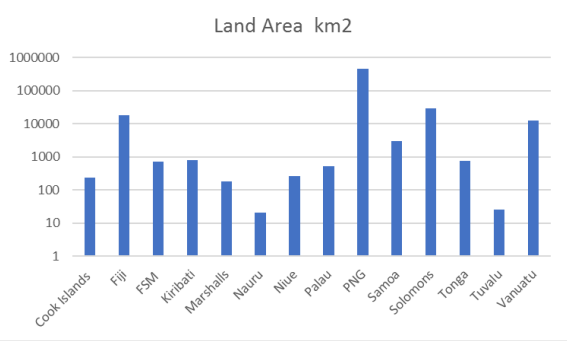
Overview of the Region and Key Climate Change Threats and Issues

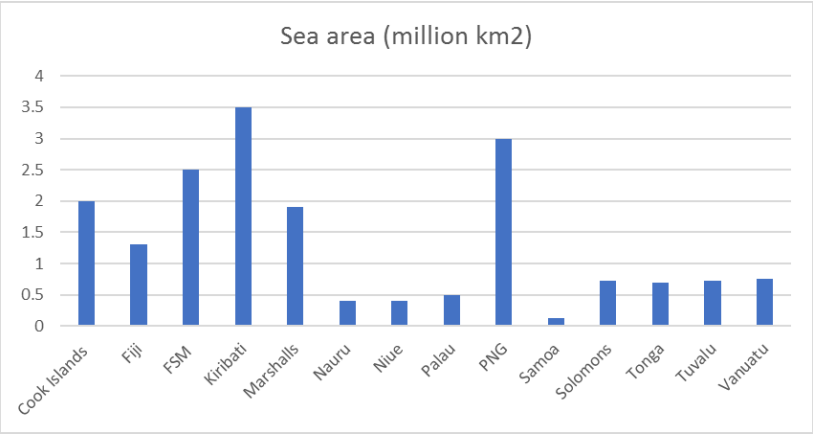
Fourteen independent nations of the Pacific have submitted Nationally Determined Contributions (NDCs) to the UN as part of their ratification of the Paris Climate Change Agreement. Islands that are part of other developed nations (as still existing colonies) are not included as their contribution to climate change emissions are part of those of the colonial nation. The independent Pacific nations all include targets and implementation plans for achieving both mitigation and adaptation. These nations include the Cook Islands, FSM, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, PNG, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu. The countries cover some 20 million square kilometres of sea area in the tropical Pacific, spreading from the Micronesian countries in the north Pacific to PNG just above Australia and across to the Cook Islands in the East. While they all share similar general climatic conditions in the warm wet tropics, the individual variations between the countries is very large. In terms of area the smallest island is Nauru with just 21 square kilometres of land area compared to PNG which, sitting on the world's second largest island, has an area of around 460,000 square kilometres. The range in population is equally great with Niue having only just over 1300 inhabitants and PNG somewhere between 7 and 8 million inhabitants. The domination of PNG is clearly seen in the graphs below, where on a linear scale most of the smaller Pacific nations barely show. It is only on a logarithmic chart that one can see the smaller countries in terms of both area and population. On the other hand, all nations share large surrounding ocean areas of typically around 1 million square kilometres each, with the exact amount dependent on what their claims are in terms of exclusive economic zones.



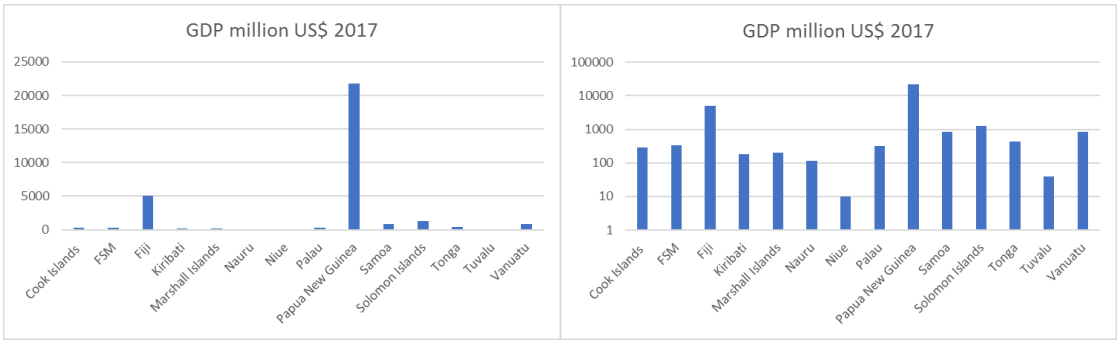








There is also considerable variation in wealth, with those countries that have political or economic arrangements with either the US (FSM, Marshall Islands, Palau) or NZ (Cook Islands, Niue) generally having more robust economies. Most of the nations without economic or migration agreements with the US or NZ are generally poorer, with the exception of Nauru, which used to be one of the richest countries in the world in terms of per capita income, due to its small population size and large mineable phosphate deposits. Unfortunately, these deposits are now running out and this country is starting to experience considerable economic problems. Fiji and the Cook Islands have very well-developed tourist industries, with Vanuatu, Samoa and Tonga somewhat less so. PNG is the only country in the Pacific region with an indigenous oil and gas industry.



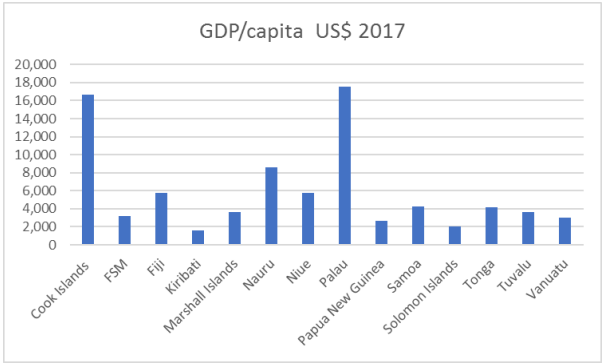


TABLE 1: SELECTED DESCRIPTORS PACIFIC ISLANDS NATIONS

Country	Population	land area	Sea area	Number of		
		km2	mill km2	islands	GDP	GDP/c
Cook Islands	19000	237	2	15	290	16700
Fiji	837000	18277	1.3	332	329	3218
FSM	103000	702	2.5	607	5054	5761
Kiribati	92000	811	3.5	33	186	1625
Marshalls	53000	180	1.9	34	199	3623
Nauru	10000	21	0.4	1	114	8575
Niue	1358	261	0.4	1	10	5800
Palau	19000	535	0.5	586	321	17570
PNG	7000000	460000	3	600	21810	2689
Samoa	183000	2934	0.12	10	844	4283
Solomons	516000	29000	0.72	900	1273	2074
Tonga	103000	747	0.7	172	437	4176
Tuvalu	11000	26	0.72	9	40	3618
Vanuatu	234000	12366	0.76	80	837	2976
Totals	9181358	526097	18.52	3380		

Key Climate Change Threats

Sea level rise: The topography of the island nations determines their vulnerability to sea level rise. The very low-lying atoll countries, Tuvalu, Marshalls and Kiribati, being only a few meters above sea level, are particularly vulnerable. It is in fact these countries which were the most vocal in setting the aspirational target of 1.5 degrees rise in global temperature above industrial times at the Paris Climate Change meeting in 2015 as any temperate rise above this level will affect their very existence. In general, however, much of the built infrastructure in the Pacific is close to sea level in all countries, with tourism in particular generally associated with nearness to the ocean. In addition, many of the Government buildings, markets, financial buildings, airports, villages, and main roads are in close proximity to the sea. Some exceptions occur in the high mountainous countries, particular PNG. Sea level rise will cause problems with water supply, coastal erosion and marine habitats. Some nations have plans in place for village relocation but unfortunately many countries are still building substantial infrastructure close to sea level, particularly in main centres.

Cyclones: Because cyclones rely on the Coriolis force, which depends on distance from the equator, the majority of cyclones form between 10 degrees and 30 degrees latitude, north and south with cyclones rarely occurring between in the doldrums, +-5 degrees of the equator. The main nations affected by cyclones in the Pacific are Vanuatu, Fiji, Tonga, Niue, Samoa and the Cook Islands, although they can affect other nations occasionally. Cyclones affect all built infrastructure, forests and agriculture, marine ecosystems, economies, the tourist sector, villages, water supply, communications and health. Many of the specified nations have experienced severe cyclones in recent times.

Increased temperatures and changing rainfall: Increased temperature and rainfall changes means any nation with tropical forests is becoming more liable to forest fires. The same changes affect health and the spread of disease vectors such as malaria, dengue and other tropical viruses,

including the zika virus. The other main sectors affected by temperature and rainfall changes are agriculture and biodiversity with some severe problems predicted for the region.

Key Issues: Adaptation versus Mitigation

Mitigation refers to the measures needed to reduce GHG emissions in a manner that will prevent serious ecological and economic damage from climate change.

Adaptation is fundamentally different from mitigation. Mitigation is a "commons" problem[13] where everyone in the world has to cooperate to solve the problem, whereas adaptation is in raw truth, every country trying to save itself. That is not to say cooperation will not assist adaptation in many cases but, when things get tough, cooperation may fail. In terms of economics, global mitigation should work towards a fall in energy use, which is likely to cause a decline in wealth (not necessarily happiness or wellbeing). There is some opinion that emissions reduction can occur at a global level while wealth still increases, but this is unlikely unless we see a complete shift in how our energy is generated, because at present over 80% comes from fossil fuels. For the poorer developing countries, a fall in wealth is not a real option and so mitigation has to occur while per capita wealth is construed to increase. Adaptation on the other hand will need serious financial resources to be deployed either by the country itself or as aid income and so the adaptation exercise will need increased national wealth.

The key issue in the Pacific in terms of climate change is how to manage the changes (adaptation) and at the same time grow the economies and progress the UN Millennial Development Goals (MDG)[14]. Poverty levels are high in many of the countries, education, health, water supply, food supply, agricultural maintenance and other issues are critical in most. At the same time cyclones, droughts and other climate related events affect GDP and development. Villages are having to rebuild and often relocate to higher ground. Crops are failing, and increased health issues are evident.

Most Pacific countries, if not all, do not think the global problem of climate change is their doing and they consider it the duty of primarily the rich countries, who have been historically the main contributors to the increased GHGs in the atmosphere, to assist with mitigation efforts and to help with adaptation. Most of the Pacific NDCs are thus conditional on receiving finance for mitigation and adaptation. In some countries corruption and mismanagement may be a problem which can affect data collection, the implementation of climate financed adaptation efforts and redistribution of wealth to assist poverty alleviation. PNG has some difficulties in this regard with a major report recently criticising the oil and gas production sector for failing the PNG population[15].

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[13] Garrett Hardin Tragedy of the Commons: Science 1968: Vol. 162, Issue 3859, pp. 1243-1248
[14] http://www.un.org/millenniumgoals/
[15] http://www.jubileeaustralia.org/latest-news/new-jubilee-report-shows-that-efic-funded-png-lng-project-has-hurt-png

Lack of qualified personnel is another issue that is affecting climate change monitoring and programs. Some countries have immigration access to either the US, NZ or other developed countries which allows qualified people to leave the home countries to earn more income elsewhere. In addition, national government salaries are generally much less than either the private sector or many NGOs, leading to an exodus from government climate change departments. This effect is particularly noticeable in PNG where the contrast in employment conditions between the public and private sector is extreme.

Any individual country with around 100,000 inhabitants or lower might expect difficulties in terms of accessing the full range of scientific competencies needed, including the Cook Islands, FSM, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Tonga and Tuvalu. In addition, countries with a remote scattered population such as Vanuatu and the Solomon Islands might also expect logistical difficulties in accessing qualified educated personnel.

In addition to climate change, some Pacific countries have inherited severe environmental problems from earlier times. Because of their remoteness some of the islands were used to test atomic weapons in the 1960s to 1970s, with extensive US nuclear tests being held in the northern Micronesian group (Marshalls) and both US and British tests being held in Kiribati. Bikini Island (Marshalls) is still today uninhabitable because of the radiation levels still present. Nauru is also particularly vulnerable because its environment has been severely degraded by nearly a century of phosphate extraction, with the country not able to supply its food, even without climate change problems.

This report will now look at a summary of the various Pacific National Communications (the SNCs) and the Nationally Determined Contributions to GHG mitigation (the original iNDCs).

Summary of Pacific Climate Change Reports

This summary has been extracted from an evaluation of existing submitted climate change documents including the Second National Communications (SNCs) and the Initial Nationally Determined Contributions (iNDCs) with some reference to other relevant documents where available.[16] The following table summarises the information gathered from the country reports with a list of the emissions (both gross and sink removals), the base year, the NDC commitments, the mitigation sectors recommended and finally whether any of the NDC reports actually mentioned the quality control problem designated by the UNFCCC as Measurement, Recording and Verification or MRV (only 2 did so). In addition, the per capita emissions are given as is the ratio between the sink and gross emissions.

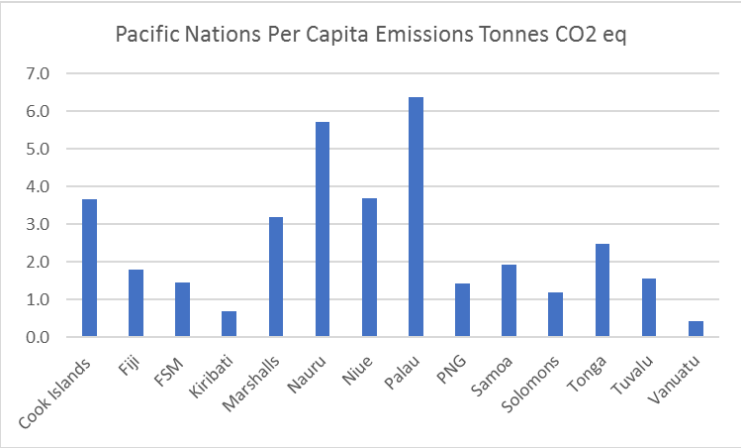
[16] The SNCs can be found at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-non-annex-i-parties/submitted-national-communications-from-non-annex-i-parties

		NDC		Emissions		Ratio	Per	Mitigation	MRV
Country	Base year	Conditional	Unconditional	Sink	Gross	Sink/Gross	Capita	Sectors	mentioned
				Gg CO2	Gg CO2		t CO2e/C		
Cook Islands	2006	27%		166	69.6	2.4	3.7	EI	N
Fiji	2013	20%	10%	7988	1500	5.3	1.8	EI, E	N
FSM	2000	28%	35%	568	150	3.8	1.5	EI E T	Y
Kiribati	BAU 2000 - 2014	49%	12.80%	na	63		0.7	EI E	N
Marshalls	2010	45%		na	169		3.2	EI E T W	N
Nauru	2014		0.6MW PV	na	57		5.7	EI	N
Niue	BAU from 2009	Electricity 80%	Electricity 38%	139	5	27.8	3.7	EI	N
Palau	BAU from 2010	Energy 22%		420	121	3.5	6.4	EI,T,W	N
PNG	BAU 2014	Electricty 100%		192000	10000	19.2	1.4	EI	Y
Samoa	BAU 2007	Electricity 100%		777	352	2.2	1.9	EI	N
Solomons	BAU 2010	45%	30%	na	618		1.2	E T EI	N
Tonga	BAU 2010	Electricity 70%		1978	255	7.8	2.5	EI T A W	N
Tuvalu	2002	Electricity 100%		0.03	17	0.0	1.5	E	N
Vanuatu	BAU 2010	Electricity 100%		7913	720	11.0	3.1	EI	N
Totals				211,949	14096.6		1.5		

Review of the Content of the Country Reports

Per capita emissions ranged from a high of 6.4 tonnes per capita in Palau to 0.7 tonnes for Kiribati. Some of the high emissions in specific countries are the result of major exports in particular sectors, such as cattle in Vanuatu, phosphates from Nauru and oil and gas from PNG. Note that the PNG value for per capita emissions in this report is taken from the NDC. The value in the SNC is around half at 0.7 tonnes per capita but this does not include emissions from the more recent oil and gas sector and there is the problem mentioned in the country report concerning the unusual ratio of motor gasoline to diesel.

In addition to the differences in per capita emissions between countries, there would certainly be a very high disparity been emissions within countries, particularly between the urban main centres and the outlying villages. Village level per capita emissions would be probably much less than 0.3 tonnes per capita per annum (close to the Vanuatu level, excluding the cattle industry). In this respect the village level emissions are close to what the world needs to get to, to remedy climate change. So, the villages are already there, they have found the solution, but it is unlikely that the rest of the world would want to revert to such 'difficult' standards of living (from the rich country point of view), and indeed many in the remote villages themselves aspire to much higher living standards, with corresponding higher emission levels (using existing technology). This aspect illustrates the fundamental tension in the climate change problem: development versus reducing emissions. This tension flows through all the country reports, with some reports mentioning the problem directly. In PNG the climate change office was named the Office of Climate Change and Development.



In terms of mitigation, in general, most of the commitments in the NDCs were thought optimistic, given the individual country situations. This is not surprising, given the short amount of time that most countries had to prepare these reports and the political pressure to come up with aggressive targets. In this regard the vulnerability of most of the nations to climate change has made them aggressive, in terms of pleading with the international community to reduce global emissions to levels that will enable the low-lying Pacific nations to actually exist by the end of this century (the 1.5 degrees target). Most Pacific countries, however, realised that they would need external assistance to reach mitigation targets.

In terms of sectors for mitigation the suggestions were very uniform with nearly every country opting for replacement of diesel generation using renewables in the electricity sector as the main opportunity. Many countries suggested 100% RE targets, but the NDC Roadmap for Nauru showed that this target could be expensive for countries that do not have substantial hydro storage. That is if a high reliability supply is specified. For smaller village systems, where a few percent down time can be managed, a 100% RE system is certainly viable and in existence in many countries. Other mitigation sectors suggested included energy efficiency, transport and improvements in waste and agriculture. The topographically high forested islands realised that the forestry sector could give mitigation opportunities and usually mentioned that such efforts were already underway via existing REDD+ programs.

The problems and barriers to GHGI preparation were also very uniform, with the lack of reliable data predominating. The data lack was generally so severe that few countries attempted any form of verification or uncertainty analysis. Nearly every report was completed with international consultants' assistance, and nearly every country had complaints about the lack of in-house capability.

Conclusions

As can be seen, the nations of the Pacific are very low emitters in terms of total gross emissions, with the region contributing only around 14 Mt of total CO2 per annum (0.035%) compared to world gross CO2 emissions of around 40 Gt. In terms of per capita emissions, while some nations

(Palau and Nauru) are close to the world average of the 6 tonnes per capita many of the more vulnerable nations (Kiribati, Vanuatu, PNG and Tuvalu) are at the lower limit of current existing national emissions (1.5 tonnes per annum). It is thus clear that in terms of mitigation the Pacific is wholly reliant on the rest of the world.

The chances of staying below a global temperature increase of 1.5 degrees are receding every year and there are thus considerable political risks in advocating a temperature limit that is not attainable. In addition, there is a clear problem in terms of development of the region where almost unanimously the nations desire, and in fact consider it essential, that they develop their economies in order to reduce poverty and increase wellbeing. Here it is difficult to suggest a path forward that is both ethically secure in terms of equality/inequality and consistent with the common goal of reducing all CO2 emissions. Clearly at this time (2018) it would not be rational for Pacific Island nations to reduce their emissions at the expense of living standards, unless (until) their per capita emissions start to exceed global per capita emissions. In general, it is clear that the global "commons" mitigation problem cannot be resolved easily with the current level of inequality in the world. In terms of the Pacific the more immediate difficulty in terms of development is the choice of focusing on capital intensive infrastructure that is currently being put in place in many of the island countries, including tourist ventures and major construction projects along coastal areas, many of which are highly likely to become stranded assets as the sea level rises and cyclones become more aggressive. There are indications that some Pacific nations are starting to realise the hopelessness of the situation and going into denial mode. For example, while Kiribati's former President Anote Tong was one of the outspoken proponents of the 1.5 degree move at Paris, the new President, Taneti Maamau, is promoting Kiribati as a long-term tourist mecca with no problems envisaged from climate change[17].

In August 2018 a new review paper came out[18] which again emphasised the difficulty of avoiding runaway climate change. The paper "Trajectories of the Earth System in the Anthropocene" stressed the likelihood of feedback loops putting the climate change problem out of the control of humans, once the tipping point was reached resulting in what the authors called a hothouse earth. Again, once the tipping point is breached the world including the Pacific would be best to move to adaptation rather than mitigation.

In 2017 Fiji assumed a global role in the UN climate change effort when it was selected for the presidency of the Bonn COP23. The Fiji Prime Minister and current COP23 President, Frank Bainimarama, has been one of the leading global voices calling on the international community to commit to more ambitious targets to curb the carbon emissions that are warming our planet.

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[17] https://cassandralegacy.blogspot.com/2018/06/the-betrayal-of-nation-how-kiribati.html
[18] Steffen et al www.pnas.org/cgi/doi/10.1073/pnas.1810141115 "Trajectories of the Earth System in the Anthropocene"

One of Fiji's innovative initiatives at the 2017 Bonn meeting was the 'Talanoa Dialogue'[19] an inclusive and participatory dialogue process that allows countries, as well as non-Party stakeholders, to share stories and showcase best practices in order to urgently raise ambition – including pre-2020 action – in NDCs. The Talanoa Dialogue was launched at COP23 in Bonn[20]. It is a mandated process requested by Parties to take stock of collective efforts to reduce emissions and build greater resilience, in line with the long-term goals of the Paris Agreement and to prepare updated or new NDCs or Biennial Update Reports (BURs) by 2020. Ultimately, the goal is to help Parties achieve maximum ambition in implementing and improving their NDCs.

This report wants to contribute to the Fijian Talanoa Dialogue concept in terms of having an honest discussion about the problems of reporting GHGI in the Pacific region and the future in terms of emissions reductions.

List of acronyms

AOSIS	Association of Small Island States
AR	Assessment Reports UNFCCC reports occurring every 7 years (about)
BP	British Petroleum (major oil company)
BUR	Biennial Update Report (a new reporting mechanism to the UNFCCC)
CO2	Carbon Dioxide (the main GHG)
CO2 eq	Carbon Dioxide equivalent, this is CO2 plus the other Kyoto gasses (the full list includes carbon dioxide, methane, nitrous oxide, HFCs and three other gasses)
COP	Conference of Parties (UNFCCC, these are the main annual climate change meetings attended by all signatories of the Convention)
FOLU	Forestry and Other Land Use
FSM	Federated States of Micronesia
GHG	Greenhouse Gasses (see CO2 eq)
GHGI	Green House Gas Inventory (national lists of GHG emissions)
HFC	Hydrofluorocarbon (organic molecule of hydrogen, fluorine and carbon, a GHG)
INDC	Initial Nationally Determined Contribution (submitted to the Paris COP, now NDCs)
IPCC	International Panel for Climate Change

[19] Talanoa is a Fijian word meaning a talk or dialogue, which is often discussed around the Kava bowl in Fijian villages.
[20] https://cop23.com.fj/talanoa-dialogue/

MDG	Millennial Development Goals (replaced by the SDG in 2015)
MRV	Measurement Reporting and Verification (IPCC protocol for GHG reporting)
N2O	Nitrous Oxide (one of the oxides of nitrogen and a major GHG)
NDC	Nationally Determined Contribution (for GHG reduction as mitigation)
NGO	Non-Government Organization
NZ	New Zealand
PIC	Pacific Island Country
PNG	Papua New Guinea
ppm	parts per million
ppb	parts per billion
RCP	Representative Concentration Pathway (used in climate modelling)
RE	Renewable Energy
REDD+	UNFCCC program for Reducing Emissions by reducing Deforestation and Degradation in forests
SIDS	Small Island Developing States
SNC	The NCs are National Communications (to the UNFCCC), the SNC is the Second National Communication, detailing the GHGI, mitigation and adaptation
UNFCCC	United Nations Framework Convention for Climate Change
US	United States (of America)

In addition, the following Prefixes are used as multipliers

k	kilo (one thousand)
M	Mega (one million)
G	Giga (one billion)

The Author

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