

Original Research Paper

# Green Leadership as an Emerging Style for Addressing Climate Change Issues in Schools

Wahab Ali

Department at the School of Humanities and Arts at the University of Fiji, (679)600, Fiji

## Article history

Received: 24-01-2019

Revised: 16-05-2019

Accepted: 21-06-2019

Email: wahaba@unifiji.ac.fj

**Abstract:** This paper attempts to investigate the concept of green leadership towards creating a greener environment through addressing issues of climate change and global warming. This initiative has been undertaken because principals take on a leading role in climate change education. As such an exploratory study was undertaken aimed at eliciting the views of principals about climate concepts and their opinions about green leadership. A survey using Likert type scale was implemented and the data was analysed using SPSS according to the survey methods conventions. Current work also consists of a thorough meta-analysis on available research in form of literature review in pertinent field. Findings reveal that the efforts taken by school principals are appreciable but a lot more can be done by them. Likewise, there is advisement for principles as to how they can undertake eco-friendly drives and become effective green leaders. This paper provides opportunities for reflection for curriculum developers and teacher educators and it hopes to encourage dialogue among policy makers, educators, stakeholders and also provides a solid platform for further research.

**Keywords:** Climate Change, Resilience, Global Warming, Green Leadership, Professional Development, Sustainable Development

## Introduction

Climate change is a defining issue of our time as it not only affects small island nations but affects the global economy at large. The unprecedented globalization paints a dismal picture of our depleting natural resources. This is because the earth's climate is changing more rapidly than before due to various human actions and ever growing technological advancement. It needs to be established that we cannot entertain progress at the expense of our vulnerable climate, which has already shown observable effects on the environment. There are many definitions of climate change and Ekpoh and Ekpoh (2011) describe it as some prolong transformation in weather configurations of a place or the world at large. Climate change is not a new phenomenon as it has been changing for millions of years. However, human influence has expedited this change resulting in serious environmental disasters and calamities such as recurrent droughts, severe heat waves, very strong cyclones, flash flooding and so on. There is ample literature that supports the view that to avoid serious climate catastrophes, one needs to adopt appropriate climate mitigation and adaptation features (Shepardson *et al.*, 2011; Wise, 2010). Fiji is no exception in this regard as noticeable consequences of climate change in way of

severe droughts, extreme flooding and occasional very damaging hurricanes. These unprecedented alterations in the climate have implications for our education system particularly the school principals as green leaders.

Education is viewed as an integral aspect of the universal antiphon to climate change and it is viewed as a catalyst for socio-economic development. Considering the imminent challenges of climate change and limited natural resources, the role of education cannot be over emphasized. It must be established that through meaningful climate change education, students and the general public can be informed about the impact of global warming and helps them adapt to climate change-related trends while also safeguarding the interest of the future generations. This goal has necessitated the need for climate change education which must be well-matched and connected to sustainable development in the new millennium. Education plays a key role in promoting and assisting students to make informed choices and decisions in relation to activities they take up. The classroom is said to be the most important unit of the educational system, as it is in it that all the policies of education are finally implemented (Sullivan *et al.*, 2014). Achieving quality education for all is the ultimate goal for all governments and principals need the

awareness and fitting leadership education so that they can transform their colleagues into green leaders.

### **Aim of the Study**

Global climate varies naturally over time and the earth's climate is changing at quite a rapid rate. This unprecedented influence of climate change calls for educating today's generation on climate change. As such the aim of this research is to develop an understanding of principals' understanding of climate change issues and their perceptions for the need for leadership training for green leadership. It is aimed at eliciting the views of the respondents about how teachers and students could be better informed about climate change issues. Subsequently, the study is guided by the following research question:

What are the principals' understandings of climate change issues and their perceptions about climate change education for a greener nation?

The above overarching question will guide the study and assist in addressing the goal of this research.

### **Significance of the Study**

This study is considered significant for various reasons and one of which is to contribute to local literature on climate change and issues associated with it by school principals. Findings will provide factual information about principals and teachers perception of climate change issues. Likewise, students will also benefit from this study as appropriate curriculum changes can be factored in regards to climate change education. While certain climate change issues are covered in the curriculum, this study will contribute to the justification for the inclusion of further pertinent issues. It will further provide justification for development of training modules for in-service training of principals and teachers. It will also benefit curriculum developers in preparation of training manuals for future leaders' workshops. These trainings equip aspiring and prospective leaders with leadership knowledge and skills and with effective green leadership strategies. The findings will also be beneficial to tertiary institutions that offer teacher education programs as they will be able to include green leadership as an appropriate style for addressing climate change issues in schools.

The subsequent sections present appropriate discourse associated with predominance and importance of climate change in educational leadership programs.

### **Literature Review**

There is abundance of literature affirming climate change to be a global phenomenon fronting the world today (Roehrig *et al.*, 2012; Shea *et al.*, 2016). Seasonal

changes occurring over many years in the world lead to climate change and global warming. Likewise, as time goes on these climate patterns not only shape the natural ecologies but also affect human economies and livelihood of people (Rai and Rai, 2013; Shea *et al.*, 2016; Wise, 2010). On similar note, the impact of climate change is multi-dimensional as it affects the whole ecosystem and well-being of all. While the earth's climate is transforming naturally, the vicissitudes have regrettably been accelerated by unjustified actions of the people. The consequences of which are disastrous in way of volatile weather patterns and accelerated rate of bigger cyclones, substantial droughts and sea water increases. It is further established that by 2100 countless small island nations and atolls would disappear due to rise in sea level (Shea *et al.*, 2016). It is assumed that green leadership in schools is one way of creating more awareness of climate change and inculcation of climate change issues in our 21<sup>st</sup> century learners.

Leadership Programs develop personal leadership skills and helps teachers to become better administrators. Such programs play a very important role up skilling heads of educational institutions so that they are able to guide and assist other teachers and students (Marzano *et al.*, 2005). Similar sentiments are being shared by Hallinger and Heck (1998) who are assertive that principals who take leadership courses are able to make substantial progress in the achievement of not only the teachers but also the students. Previous literature further reveals that meaningful leadership is one that prepares leaders to establish appropriate training and development programs for staff members (Dinham, 2005; Greenlee, 2007; Hancock, 2008; Leithwood *et al.*, 2003; Msila, 2014). In this case, the most practical panache is the green leadership style. Green leadership is a style that espouses global environmental protection and considers climate change mitigation and resilience as a means of sustainable development. Principals as leaders need to act proactively by undertaking sustainable development projects that address biodiversity and hence model green leadership. Accordingly, Gole (2012) defines green leadership as a style that is eco-friendly and promotes and practices climate change mitigation and resilience actions. Thus the goal for the principals and teachers is to build a greener society and be able to involve the students, parents and the society in so called the green revolution.

Leadership training or professional development of teachers can lead to better understanding of sustainable development to help realize a sustainable future (UNESCO, 2015). In regards to climate change Selby and Kagawa (Jenkins, 2003) affirm that climate change needs to be approached in an interdisciplinary manner and not associate it as a science subject. For example, an international study on climate change education reveals that it is mostly associated with the science subjects and

in many cases it is addressed only within science education (Rolls *et al.*, 2009). Similarly, in regards to teacher education, UNESCO has formulated teacher education courses specially meant for teachers. The course is ideal for teachers as it enables them to gain climate change knowledge and skills in regards to causes and effects through a holistic approach. Moreover, the course is structured in such a way that it covers a wide range of pedagogical practices and procedures that are contextual and can be easily implemented. According to Selby and Kagawa (Jenkins, 2003), the authors of this book, the course develops teachers' proficiencies so that they are able to prepare them for climate change oriented teaching (Selby and Kagawa, 2013).

Likewise, teachers can be provided in-service training and special professional development sessions for not only science teachers but for other teachers who can effectively deliver climate change programs. Likewise, Shea *et al.*, (2016) establishes that professional development programs provides an idealistic conduit for climate change education. This is because climate change education is quite multifarious as it consists of various issues from global warming to greenhouse effect and intense changes in the weather patterns. On similar note, McKeown and Hopkins (2010) see climate change as an umbrella notion that includes environmental, social, economic and political problems and issues facing communities globally. Teachers for climate change education need to know the concepts and learn about the causes, effects and challenges of climate change. In this regard Hansen (2010) is confident that school leaders and teachers need good quality education s that they are able to comprehend climate change and adaptation strategies. This is why classrooms are viewed as a microcosm of the society and this situation calls for dialogue and discussion between all stakeholders (Sullivan *et al.*, 2014).

Having considered professional development and in-service training for teachers, one needs to cogitate having a curriculum that consists of climate change adaptation and resilience knowledge and skills. Likewise, according to Wise (2010) students need an interactive curriculum that can prepare students well on climate change issues. The curriculum according to research should be such that it contains vital climate change concepts and terms (Shea *et al.*, 2016; Sullivan *et al.*, 2014). Likewise, Sullivan *et al.* (2014) insists that apart from curriculum, pedagogy and practice should be such that can equip students with climate change knowledge and adaptation skills. Shea *et al.* (2016) supports the views of Sullivan *et al.* (2014) that having sound climate change education is a prerequisite for responding to global climate issues. Accordingly, United Nations (2016) maintains that Climate Change Education is seen as nurturing understanding of the intricacies and

interconnection of the countless challenges posed by climate change. More explicitly, it supports learning about the causes and effects of climate change and how the human activities expedite the harmful effects as well how these activities could be addressed. There is urgent need to have a curriculum that develops proficiencies in climate preventive measures in order to make people resilient to climate related catastrophes. It must be established that climate change education makes our students get prepared and make informed decisions and no doubt, this ingenuity has implications for teacher training programs.

Evidently, there are implications for tertiary institutions as they need to include climate change topics in tertiary institutions that offer teacher training. Moreover, the training program should be such that it prepares trainee teachers to understand the intricacies associated with climate change and be able to impart the knowledge to the students (Chang, 2013). Trainee teachers do not only need the content knowledge but they also need to understand the pedagogical practices associated with getting the message across to the students. As teachers they should prepare students who are able to understand the atrocities associated with climate change and develop a more positive attitude towards preserving our environment. Likewise, Hestness *et al.* (2014) assert that trainee teachers need to be well trained to address complex scientific constructs and be scientifically informed. On similar note, Oversby (2015) affirms that trainee teachers need to be well prepared during their pre-service teacher training program as climate change education occupies a major place in the school system. As such, teacher training programs need to be revisited so that teachers are well versed with climate change and mitigation strategies.

There appears then a need to transform today's principals into green leaders as people all over the world are concerned and worried about unprecedented environmental issues associated with climate change. As heads of educational institutions principals can use their influence to create awareness of climate change by different forms of education. Likewise, teachers need to have a good content knowledge about climate change so that they can prepare climate resilient society (Chiedozie *et al.*, 2015). It must be noted that Fijian Government has taken positive actions towards combatting climate change by including environmental issues in Fiji at all levels. This intervention warrants a greater exposure and adaptation to climate change initiatives (Ministry of Foreign Affairs, 2019). Considering the unpredictable weather patterns and challenges associated with climate change, the Government of Fiji has undertaken curriculum reforms to include climate change education from primary to tertiary level. The Ministry of Education in collaboration with Ministry of Foreign Affairs in Fiji have joined hands to develop a training program to

educate not only the students but the general public towards becoming a climate change resilience community. Thus empowering principals and teachers is seen as vital for addressing climate change issues in schools as well as the society at large.

### Research Methodology

Given the purpose of the research, this study is guided by the following research question:

What are the principals' understandings of climate change issues and their perceptions about climate change education for a greener nation?

This research question will help guide the study to develop a better understanding of principals understanding of climate change issues and the need for transforming leaders to have a better understanding and concept of climate change. Survey research is one of the most important areas of measurement in applied social research. Moreover, there are many types of surveys ranging from likert scale type to open ended responses. Survey research does not belong to any one discipline and it can be employed by any field. Moreover, surveys are a favoured tool for many who are engaged in research as it provides a quick and effective mode of gathering data (Wilkinson and Birmingham, 2003). The nature of the research inquiry in the current study merited the

implementation of a survey research design. Likewise, survey was also used by Arredondo and Bauch (Hogan, 2006) in their study about principles' perception about climate change. A number of advocates of leadership and change have used survey for their studies (Brinia, 2011; Viviane, 2008). As such, five point Likert type scale ranging from SA for *Strongly Agree*, A for *Agree*, U for *Unsure*, D for *Disagree* and SD for *Strongly Disagree* was used for numbers 1 to 12. Table 1 shows the different study constructs with respective variables. Table 1 shows the different study constructs with respective variables.

### Research Sample and Reliability

This study targeted principals from all over Fiji but it was not possible reach them all due to their demographical locations. As such 160 principals were randomly selected from 212 principles administering secondary and vocational schools in Fiji. The survey was administered to 160 principals and 96 of them attempted the survey resulting in a response rate of 60% which is acceptable for discussion. The Cronbach's coefficient alpha ( $\alpha$ ) was used to assess the reliability of the study constructs as it is widely used for assessing the reliability of measurement scales with multi-point items. The reliability of the constructs based on the 12 items was 0.81. The stated value of Cronbach's Alpha reveals that the multi-dimensionality of the constructs but was taken as reliable to address the research question.

**Table 1:** Study constructs and variables

Constructs	Mean	Std. Deviation	N
I know the meaning of the term climate change	4.38	0.603	96
I know the meaning of the term global warming	4.32	0.747	96
I know the meaning of the term greenhouse	4.27	0.703	96
We all can play our parts in preserving our environment through sustainable development	4.68	0.470	96
There is urgent need for teacher professional development in the areas of climate change and global warming	4.52	0.502	96
School students from an early age can become good agents for change	4.42	0.706	96
The school curriculum for students should be upgraded to include climate change adaptation issues across all subject areas	4.40	0.840	96
Climate change concepts should be covered in teacher education programs	4.39	0.786	96
Many of the coastal villages will be submerged in water due to global warming in another 20 years?	4.41	0.535	96
There are ample initiatives taken by Governments to create awareness about climate change	4.41	0.734	96
Transforming teachers for green leadership will assist in addressing climate change issues to a large extent	4.12	1.059	96
We all can play our parts in preserving our environment through sustainable development	4.31	0.825	96

## Findings and Discussion

This section discusses the findings as per the research questions according to thematic approach.

### Demography

Demographical information reveals that majority (68%) of the principals are quite young and in the 30 -49 year range (Table 2). The Ministry of Education in Fiji has recently implemented Open Merit recruitment System (OMRS) and a lot of young teachers have been promoted to principals. There is quite an even spread of young and experienced teachers in the field.

Demographic data in regards to gender distribution revealed that majority (72%) of the principals were males while the remaining (28%) were females. One of the reasons for this disparity is due to the unwillingness of the females to apply for principal positions in maritime and rural schools. Majority of the schools in the Eastern division, Bua macuacta and Cakaudrove are either in maritime or in remote rural areas (Ali, 2004).

### Climate Change

The first 3 questions stated in the survey targeted at the principles' knowledge about terminologies associated with climate change. It is overwhelming to know that despite having different subject backgrounds, most of the principals are aware of the terms associated with climate change (Table 3).

Findings reveal that almost all (90%) of the principals are well versed with terms related with climate change terminologies. This is a good reflection on part of the principals as they are viewed as the key change agents in the society. However, a marginal group (10%) of them were unsure and disagreed that they knew all the terms. This is quite acceptable as they may be arts students and may not have done science subjects. As such, they may lack basic science concepts and this paucity of knowledge has implications for teacher educators and universities. Principals and teachers play a very important role in preparing scientifically informed students who are able to comprehend and address complex scientific constructs. Literature in this domain supports this view that teachers need to be well educated in climate change mitigation factors so

that there is effective rollover impact on the students (Hestness *et al.*, 2014).

Findings further reveal that all the principals in the survey unanimously agreed irrespective of teaching majors, all teachers should have basic knowledge about climate change. This is because climate change education is an indispensable piece of the jigsaw puzzle as teachers are the means by which today's students will become tomorrow's informed citizens and climate change advocates. The President of COP23 Mr. Bainimarama stressed the importance of understanding the impact of climate change and global warming. In his opening remarks he stated that we are all bound by our common interest in reducing concentrations of greenhouse gases in the atmosphere for the good of humanity. The COP also provides a sound platform for numerous stakeholders to demonstrate that global warming and greenhouse gas reductions and the transformation to a sustainable society were already well underway. Similarly, principals also agreed that we all need to play our parts in preserving our environments through sustainable development. Combating climate change is intimately linked with people and resource equity. Therefore, establishment of mutual understanding between climate change and sustainable development is extremely relevant in global scenario. This calls for proper assessment of International and local climate change mitigation policies based on sustainability criteria. As such, the increasing concern over climate change drives towards the search of solutions enabling to combat climate change and global warming into broader context of sustainable development (Rai and Rai, 2013). Hence, the core element of sustainable development is the integration of economic, social and environmental concerns in policy-making all over the world.

**Table 2:** Age group of the principals

		Frequency	Percent
Valid	40 - 49 years	35	36.5
	30 - 39 years	30	31.2
	50 - 55 years	18	18.8
	20 - 29 years	13	13.5
	Total	96	100.0

**Table 3:** Knowledge of terms associated with climate change

Construct	Strongly Agree		Agree		Unsure		Disagree	
	No.	%	No.	%	No.	%	No.	%
I know the meaning of the term climate change	42.0	43.8	48	50.0	06	6.2		0
I know the meaning of the term global warming	44.0	45.8	42	43.8	7	7.3	3.0	3.1
I know the meaning of the term greenhouse effect	39.0	40.6	45	46.9	11	11.5	1.0	1.0
Average	41.6	43.4	45	46.7	8	8.4	1.3	1.8

### Teacher Professional Development

While responding to question number 6 in the survey, majority (90%) of the principals agreed that there was an urgent need for teacher professional development in the areas of climate change and global warming (Table 4). Likewise, UNESCO (2015) and UNITAR (Jenkins) has recognized the need for teacher upgrade and professional development of teachers in regards to climate change education. Both the international organizations are assertive that to promote climate change education, one needs to have an effective teacher education program inclusive of climate change mitigation and adaptation strategies. Existing teachers and principals no doubt need professional development in climate change education. However, an important point raised by Selby and Kagawa (Jenkins) is that climate change needs to be approached in an interdisciplinary way as opposed to associating it with science subjects. In this manner all principals irrespective of their subject specialties can upgrade themselves in climate change education. Therefore, teacher in-service or professional development course should be such that it fills the gaps and in line with one of UNESCO's key objectives for climate change education (Selby and Kagawa, 2013).

Only a few of the teachers were either unsure or disagreed and this view is quite acceptable. This is because during teacher training programs, they are only exposed to certain subject areas. For example, a teacher can be trained only in accounting and economics or in mathematics and physics. These teachers may not have ample knowledge about climate change while teachers doing biology and chemistry may have ample knowledge about climate change. Thus principals believed that there was a need for teacher professional development in the areas of climate change and global warming for all teachers. Literature affirms that some teachers do have climate change knowledge but a good number of them lack confidence and feel unprepared due to lack of science background.

Hestness *et al.* (2014) agrees with Ekborg and Areskoug (Hogan, 2006) that teachers should possess scientifically informed knowledge about climate change to be able to prepare students accordingly. They further claim that teachers should be able to understand and analyze complex scientific constructs like the relationship greenhouse gases and climate change. We may not be able to completely stop climate change in its tracks but with appropriate adaptation measures, the effects can be minimized to a large extent (Ekborg and Areskoug, 2006). Similar sentiments have been shared by Holthuis *et al.* (2014) who recommend that teacher professional development is needed to help teachers upgrade their climate change knowledge.

**Table 4:** Need for teacher professional development in the areas of climate change and global warming

	Frequency	Percent
Strongly Agree	50	52.1
Agree	38	39.6
Unsure	6	6.2
Disagree	2	2.1
Total	96	100.0

As stated earlier, the skills necessary to decipher climate change knowledge effectively at classroom still level remains a challenge (Holthuis *et al.*, 2014). Subsequently, Hestness *et al.* (2014) strongly recommends that existing teachers should undergo extensive professional development sessions in order to successfully integrate climate change into their existing practices. Such sessions would provide valuable opportunities to teachers to familiarize themselves with issues and in way contribute to enhancing literacy associated with climate change (Hestness *et al.*, 2014). Thus, professional development is viewed as vital for teachers so that they are well equipped to translate climate change knowledge to the students (Veramu, 2018).

### Curriculum Relevance

Given the current high profile debate on climate change, at times the important roles played by students are not recognized. If teachers are well versed with climate change issues, they will be able to transmit the knowledge and skills to the students. Majority of the principals agreed (91%) that students can become good change agents. In an empirical study undertaken by Shepardson *et al.* (2009) discovered that students have many conceptions about global warming and climate change. All they need is a curriculum that supports climate change initiatives. Subsequently, Table 5 shows the response of the principals in regards to item number 7.

Certainly, there is no shortage of agreement when it comes to the curriculum content in regards to climate change and global warming. Almost all the principals agreed (94%) that school curriculum needed to be upgraded to be inclusive of climate change adaptation issues. While there are certain topics covered at certain levels, principals believed that relevant issues should be covered at all levels. Climate change scientists agree that the earth's climate is warming up at a much faster rate than before and this calls for urgent climate change education (McKeown and Hopkins, 2010). On similar note, United Nations Institute for Training and Research has developed a resource guide that could be used by agencies in charge of curriculum sections relevant authorities associated with climate change and mitigation (UNITAR, 2013). A lot of countries have started

incorporating climate change topics across the curriculum and Singapore is no exception (Chew-Hung, 2017).

On a similar note, Fiji is no exception as Education Ministry has developed a climate change education curriculum for primary schools which for Year 7 and 8 students. While other climate change issues are covered at all levels there is a special text book for climate change specifically to be used by year 7 and 8 students. The education ministry has reviewed its curriculum and have accommodated climate change issues through an integrated curriculum (Simmons, 2016). ICT could also be used effectively in the dissemination of knowledge about climate change (Makrakis *et al.*, 2012). Considering the intricacies associated with climate change, it must be realized that a holistic approach needs to be implemented with the aim of creating an inclusive society (UNITAR, 2013). Supporting the initiative of UNITAR, Holthuis *et al.* (2014) strongly claim that students need a fertile curricular that has ample climate change and global warming content. Accordingly, Nursey-Bray (2010) cautions the curriculum developers that in developing appropriate curricula the needs of the target audience needs be considered and curricula should be tailored accordingly. Climate Change curricula should be adaptive so that it is able to build bridges within the exercises and practice of the lessons (Nursey-Bray, 2010).

### *Teacher Training*

An equally important feature noted in the promotion of climate change is teacher education programs. Almost all (98%) principals agreed that teacher training institutions need to prepare trainee teachers well in climate change issues (Table 6). Principals believed that climate change education should be a core aspect of any teacher education program. Initially it is only covered as a science subject but now there is need for it to be covered in an inter-disciplinary approach. On this note, numerous teacher training institutions have called for the inclusion of science content related to climate change in their teacher education programs. They hope this inclusion will improve teachers' preparedness to address climate change issues at school level (Ekborg and Areskoug, 2006; Hestness *et al.*, 2014; Holthuis *et al.*, 2014). Since our students are digital natives, Hestness *et al.* (2014) has strongly recommended that trainee teachers should be well equipped with technological knowledge so that they are able to integrate technology into their teaching.

The sentiments expressed by the principals embodies the views of Holthuis *et al.* (2014) that in order to promote climate change education, it is crucial to strengthen teachers' capacities to deliver accurate information about climate change. A growing body of

empirical evidence in form of previous literature supports this prominence on teacher education and its relationship to learning (Chiedozie *et al.*, 2015; Holthuis *et al.*, 2014; Makrakis *et al.*, 2012; Shea *et al.*, 2016; Wise, 2010). Researchers are gaining an understanding of how teacher education content could be upgraded to incorporate topics that could lead to a conceptual understanding of climate change concepts. Likewise, Holthuis *et al.* (2014) whose studies focused on how public tend to understand the concept of climate change. Their study concentrated on how teachers provided scaffolding that supported students' understanding of climate systems and the causes and effects of it.

In supporting the views of (Holthuis *et al.*, 2014; Hestness *et al.*, 2014) establishes that teachers must not have only the content knowledge but they also should be able to have an understanding of future predictions related to climate change impacts. The teacher training program should be designed to give teachers confidence in facilitating climate change and sustainability education. This in turn would help young generation to understand climate change and be prepared to reduce the severity of future climate calamities (Lee *et al.*, 2012).

### *Coastal De-Sedimentation*

Climate change is a universal issue and not only restricted to small island nations. Likewise, coastal management and coastal sedimentation, are influenced by numerous natural and anthropogenic factors, which interact at various intensity over a long span of time (Lukas, 2017). These changes lead to continuous rise in temperature which is very injurious for the mankind as it is directly affects our health. The rapid escalation in temperature leads to high heat waves during summers and lesser cold waves during winters. Climate change also results in extreme droughts, high intensity floods, massive landslides and very strong hurricanes and Fiji is no exception to these calamities. As depicted in the Table 7, majority (92%) of the principals agreed many of the coastal villages are at the mercy of mother nature and may cease to exist in the next 20 years. Over two decades of vulnerability assessments have shown the Pacific Islands region are one of the most at risk regions to the adverse consequences of climate change (Hay and Mimura, 2013). Research further shows that the people of Tuvalu and Kiribati in the north Pacific and Australia's Torres Strait Islanders are now voyaging towards an uncertain future. Rapidly rising sea levels and massive king tides are encroaching on their villages and salt is affecting arable land. The mass migration of entire island communities is imminent (Connell, 2015).

**Table 5:** Upgrading Curriculum to include climate change adaptation issues across all subject areas

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	49	51.0	51.0	51.0
Agree	41	42.7	42.7	93.8
Disagree	6	6.2	6.2	100.0
Total	96	100.0	100.0	

**Table 6:** Climate change concepts should be covered in teacher education programs

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	41	42.7	42.7	42.7
Agree	53	55.2	55.2	97.9
Unsure	2	2.1	2.1	100.0
Total	96	100.0	100.0	

**Table 7:** Many coastal villages will be submerged in water due to global warming

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	50	52.1	52.1	52.1
Agree	38	39.6	39.6	91.7
Unsure	5	5.2	5.2	96.9
Disagree	3	3.1	3.1	100.0
Total	96	100.0	100.0	

Principal's concerns are quite valid and justifiable the warming of the ocean surface around small island states has already been detected and this trend is expected to continue (Keener *et al.*, 2012). Forecasts reveal that this warming is a complemented by strong winds, heavy rainfall and by more intense or frequent cyclones (COP23, 2017). Sea-level rise has become increasingly apparent in the Pacific, with the South Pacific becoming one the most vulnerable regions to unprecedented changes. These changes can lead to erosion of small island states and lead to the extinction of freshwater aquifers to complete vanishing of many smaller islands (Terry and Thaman, 2008). Findings by Terry and Chui (2015) are more distressing as their study revealed that even if people showed physical resilience by building sea walls, a time may come when the island may become uninhabited due to total depletion of water. This is because the coastal villages are in constant fear of increased rates of coastal erosion and shoreline regression. Evidently, the concerns expressed by the principals are spot-on and has emerging implications for relevant authorities and government agencies.

#### *Government Initiatives*

On a similar note, majority (80%) of the principals agreed that there are ample initiatives taken by Governments to create awareness about climate change. There was massive awareness last year since Mr. Bainimarama, the Prime Minister of Fiji, a small island nation in the Pacific presided over COP23. Fiji became the first small island state to be chosen to preside over the COP23 meeting held in Bonn in November 2017 (COP23, 2017). It was significant time for Fiji's

selection for presidency as it is one of the vulnerable island nations that is currently facing the brunt of climate change. Subsequently, it is the economic and technological nucleus of the Pacific and a conduit for sustainable development in the region. On a similar note, Fiji's COP23 presidency has provided an empowering voice to the struggles of many small island nations and it has been able to provide a vigorous voice for the 7.5 billion people on this earth (Veramu, 2018). Resilience and adaptive ability are both conceptions that are essential to our understanding of how good social and political outcomes for climate change adaptation can be achieved.

Analysis further reveal that some (20%) of the principals disagreed and believed that Governments needed to take more proactive measures in regards to climate change. In an empirical research undertaken by the scientists from the University of Florida state that there are many ramifications of climate change and governments had to do much more. Due to sea level rise many coastal villages needs to be relocated as such they need to be prepared for mass migrations (Gainesville, 2011). Evidence for in support of this position can be found in the work of Leal-Arcas (Jenkins) who supports Gainesville (2011) by suggesting the need for appropriate policies and procedures where trade mechanisms could be used as tools for safe guarding ecofriendly environment. It is envisaged that a regional approach is more appropriate before a global goal is achieved. Both approaches can be facilitated at bilateral level in order to share and create a strong inter- national framework for climate action. However, Boon's (2014) warning is quite timely that responsibility for climate

change adaptation and mitigation is not only the responsibility of the governments but all individuals.

### *Green Leadership*

While the rippling effects have begun, more drastic climate change effects will most acutely be felt by future generations in years to come. As such, education can play a big role in the dissemination of knowledge and skills in addressing climate change issues. This is where teachers come in and majority (85%) of the principals agreed that preparing teachers for green leadership can have a more lasting effect in the community. This is because they directly affect the lives of thousands of students in their care. According to a UNESCO Report 2,500 primary school teachers and 1,000 primary school principals have been trained in climate change education in Albania while 7,000 teachers have been trained in the Republic of Korea (Buckler and Creech, 2014). Supporting this view, Boon (2014) argues that since children spend most of their time in their homes and schools, climate change needs to be well covered in schools as well as at homes.

Undoubtedly, teachers do play an important role as teachers have been cited as the most trusted sources of climate change communication and information (Ashworth *et al.*, 2011). Teachers therefore can play a role in informing students and parents who, had indicated that they were unsure about climate change science and did not trust communications from the media and the government, as compared with principals and teachers (Ashworth *et al.*, 2011). As such, principals should be given in-service training in ways they could adopt green initiatives in their schools. In essence, a holistic perspective needs to be adopted and interventions need to be applied in way of in-service training so that influences are more likely to filter through to other teachers and children via their microsystem connections (Boon, 2014). Accordingly, principals, teachers and the students can all become green leaders and become the ambassadors of climate change initiatives in their villagers and communities at large.

### **Limitations of the Study**

There is a lack of local literature on climate change education as such international literature has frequently been quoted. Additionally, the time available for this research was very limited as certain deadlines had to be met but a more detailed research will be initiated in the near future. In addition, contacting the principals was very difficult as some of them were teaching in remote and maritime schools that could not be accessed easily. The self-reported nature of the data, based upon principals' perceptions about their own knowledge and views about climate change is a limitation of the study, as the results in this study were not verified by observations or other independent measures. As a result, these results should be

viewed as a snapshot of principals' perceptions and practices around climate education and as a starting place for discussion and further investigation.

### **Recommendation and Conclusion**

The present day world scenario forecasts a gloomy picture entailing a demise of interest and care for our environment. There is a new era emerging that requires a new breed of leaders. Hence, it is recommended that:

- Educational authorities need to organize professional development sessions for principals and school heads so that they are able to better implement climate change initiatives at school level
- Principals should be provided with adequate resources to implement climate change initiatives
- Principals need to develop confidence in their ability to teach and supervise climate science education in their schools
- Principals need to develop green leadership skills necessary for developing and disseminating teaching resources that foster student learning within personal and societal context; and
- Leadership programs need to cover climate change issues so that leaders are prepared climate change adaptation and mitigation activities

Climate change is a global problem that requires local solutions that are manageable and achievable. As such it is recommended that Findings from the current study are generally in agreement with those studies that indicate the importance of having green leadership in schools. Indeed green leadership can assist in creating a knowledge society that will have the skill base and values needed to understand and create solutions for issues associated with changing climate. Thus, as the climate change story continues to unfold, green leadership is well positioned to assume a leading role in setting the stage for a new chapter in climate change education.

### **Acknowledgement**

This research paper was made possible through the help and support of heads of the schools in Fiji and in essence, all sentient beings. Without the cooperation and understanding of the principals, this study would not have materialized. Finally, the views and opinions expressed in this article are those of the author and does not necessarily reflect the views of the University where the author is employed.

### **Ethics**

Ethical issues were taken into consideration throughout the course of this study. Considering the importance the participants have not been identified in

order to maintain confidentiality and anonymity of the participants. To further maintain high ethical etiquettes relevant information such as the aim and the purpose of the study were communicated well in advance to the participants. Participants were also at a liberty to withdraw their involvement in the study at anytime without any prior notice.

## References

- Ali, W., 2004. Challenges in Multi-class Teaching: Case study in a Fiji school. Master's Thesis. University of the South Pacific. Suva, Fiji.
- Arredondo, R.D. and P.A. Bauch, 2006. Reflective, ethical and moral constructs in educational leadership preparation: Effects on graduates' practices. *J. Educat. Administrat.*, 44: 487-508. DOI: 10.1108/09578230610683778
- Ashworth, P., T. Jeanneret, J. Gardner and H. Shaw, 2011. Communication and climate change: What the Australian Public Thinks. 1st Edn., Canberra: CSIRO Publishing.
- Boon, H.J., 2014. Climate change ignorance: An unacceptable legacy. *Australian Educat. Res.*, 42: 405-427. DOI: 10.1007/s13384-014-0156-x
- Brinia, V., 2011. Men Vs women; educational leadership in primary schools in Greece: An empirical study. *Int. J. Educat. Manage.*, 26: 175-191. DOI: 10.1108/09513541211201988
- Buckler, C. and H. Creech, 2014. Shaping the future we want: UN decade of education for sustainable development (2005-2014). Paris: UNESCO.
- Chang, C.H., 2013. Advancing a framework for climate change education in Singapore through teacher professional development. *HSSE Online*, 2: 28-35.
- Chew-Hung, C., 2017. The curriculum of climate change education: A case for Singapore. <https://eric.ed.gov/?id=EJ1138648>
- Chiedozi, O.L., C.O. Ezeugbor and F.O. Okoye, 2015. Climate change awareness and institutional management strategies by principals of secondary schools in Anambra State. *British J. Educat.*, 3: 32-40.
- Connell, J., 2015. Vulnerable islands: Climate change, tectonic change and changing livelihoods in the western pacific. *Contemporary Pacific*, 27: 1-37.
- COP23, 2017. UN climate change conference. <https://cop23.com.fj/>
- Dinham, S., 2005. Principal Leadership for Outstanding Educational Outcomes. *J. Educational Administration*, 43: 338-356.
- Ekborg, M. and M. Areskou, 2006. How student teachers' understanding of greenhouse effect develops during a teacher education programme. *Nordic Stud. Sci. Educat.*, 2: 17-29.
- Ekpoh, U.I. and I.J. Ekpoh, 2011. Assessing the level of climate change awareness among secondary school teachers in calabar municipality. Nigeria: Implication for management effectiveness. *Int. J. Humanities Soc. Sci.*, 1: 125-140.
- Gainesville, F., 2011. Climate change; governments must plan for migration in response to climate change, researchers say. *Energy Weekly News*.
- Gole, P.P., 2012. Green leadership: Ways of practicing it. *IPCSIT*.
- Greenlee, B.J., 2007. Building teacher leadership capacity through educational leadership programs. *J. Res. Educational Leaders*, 4: 44-74.
- Hallinger, P. and R.H. Heck, 1998. Exploring the principal's contribution to school effectiveness: 1980-1995. *Effectiveness School Improvement*, 9: 157-191.
- Hansen, P.J.K., 2010. Knowledge about the greenhouse effect and the effects of the ozone layer among Norwegian pupils finishing compulsory education in 1989, 1993 and 2005-What now? *Int. J. Sci. Educat.*, 32: 397-419.
- Hay, J.E. and N. Mimura, 2013. Vulnerability, risk and adaptation assessment methods in the pacific islands region: Past approaches and considerations for the future. *Sustainability Sci.*, 8: 391-405. DOI: 10.1007/s11625-013-0211-y
- Hestness, E., R.C. McDonald, W. Breslyn, J.R. McGinnis and C. Mouza, 2014. Science teacher professional development in climate change education informed by the next generation science standards. *J. Geosci. Educat.*, 62: 319-329.
- Holthuis, N., R. Lotan, J. Saltzman, M. Mastrandrea and A. Wild, 2014. Supporting and understanding students' epistemological discourse about climate change. *J. Geosci. Educat.*, 62: 374-387.
- Hancock, G.R., 2008. School leadership: A study investigating how emergent formal school leaders understand and collaborate with informal leaders to develop a better understanding of the terrain they are entering. (3310474), University of Pennsylvania, United States--Pennsylvania.
- Hogan, R. P. A. T. F. O. O., 2006. *Personality and the fate of organizations*. Hillsdale, NJ: Erlbaum.
- Jenkins, T., 2013. Reflections on Kenneth E. Boulding's *The Image: Glimpsing the Roots of Peace Education Pedagogy*. *J. Peace Education Social Justice*, 7: 27-37.
- Keener, V.W., J.J. Marra, M.L. Finucane, D. Spooner and M.H. Smith, 2012. Climate change and pacific islands: Indicators and impacts. <http://www.cakex.org/sites/default/files/documents/Exec-Summary-PIRCA-FINAL2.pdf>
- Leal-Arcas, R., 2013. Climate change mitigation from the bottom up: Using preferential trade agreements to promote climate change mitigation. *Carbon Climate Law Rev.*, 7: 34-42.

- Lee, H., H. Chang, K. Choi, S.W. Kim and D.L. Zeidler, 2012. Developing character and values for global citizens: Analysis of pre-service science teachers' moral reasoning on socioscientific issues. *Int. J. Sci. Educat.*, 34: 925-953.
- Lukas, M.C. 2017. Widening the scope: Linking coastal sedimentation with watershed dynamics in Java, Indonesia. *Reg. Environ. Change*, 17: 901-914. DOI: 10.1007/s10113-016-1058-4
- Leithwood, K., D. Jantzi and R. Steinbach, 2003. *Changing leadership for changing times*. Berkshire: Open University Press.
- Msila, V., 2014. Challenges to the introduction of an alternative leadership style: A school principal's journey in the introduction of an 'ubuntu leadership model'. *Mediterranean J. Social Sci.*, 5: 1738-1747.
- Makrakis, V., N. Larios and G. Kaliantzi, 2012. ICT-enabled climate change education for sustainable development across the school curriculum. *J. Teacher Educat. Sustainability*, 14: 54-54. DOI: 10.2478/v10099-012-0009-5
- Marzano, R.J., T. Waters and B.A. McNulty, 2005. *School leadership that works*. CO: McREL. Denver.
- McKeown, R. and C. Hopkins, 2010. Rethinking climate change education. *Green Teacher*, 89: 17-21.
- Ministry of Foreign Affairs, 2019. Climate Change Education. <http://www.foreignaffairs.gov.fj/media-resources/media-release/77-climate-change-in-school-curriculum>
- Nurse-Bray, M., 2010. Climate change adaptation in Australia. *Int. J. Climate Change Strategies Manage.*, 2: 393-402. DOI: 10.1108/17568691011089918
- Oversby, J., 2015. Teachers' learning about climate change education. *Procedia Soc. Behavioral Sci.*, 167: 23-27. DOI: 10.1016/j.sbspro.2014.12.637
- Rai, P.K. and P.K. Rai, 2013. Paradigms of global climate change and sustainable development: Issues and related policies. *Environ. Skeptics Critics*, 2: 30-30. DOI: 10.0000/issn-2224-4263-environsc-2013-v2-0003
- Roehrig, G., K. Campbell, D. Dalbotten and K. Varma, 2012. Cycles: A culturally-relevant approach to climate change education in native communities. *J. Curriculum Instruct.*, 6: 73-89.
- Rolls, S., K.D. Maden and T.I. Roug, 2009. *Searching for a Sea Change, One Drip at a Time: Education for Sustainable Development in Denmark*. 6th Edn., Springer International Publication, Switzerland.
- Selby, D. and F. Kagawa, 2013. Climate change in the classroom. <http://unesdoc.unesco.org/images/0021/002197/219752e.pdf>
- Shea, N.A., C. Mouza and A. Drewes, 2016. Climate change professional development: Design, implementation and initial outcomes on teacher learning, practice and student beliefs. *J. Sci. Teacher Educat.*, 27: 235-258. DOI: 10.1007/s10972-016-9456-5
- Shepardson, D.P., D. Niyogi, S. Choi and U. Charusombat, 2009. Seventh grade students' conceptions of global warming and climate change.
- Shepardson, D.P., D. Niyogi, S. Choi and U. Charusombat, 2011. Students' conceptions about the greenhouse effect, global warming and climate change. *Climatic Change*, 104: 481-507. DOI: 1007/s10584-009-9786-9
- Simmons, M., 2016. Climate change curriculum for schools. <http://www.fjitime.com/story.aspx?id=353148>
- Sullivan, S.M.B., T.S. Ledley, S.E. Lynds and A.U. Gold, 2014. Navigating climate science in the classroom: Teacher preparation, perceptions and practices. *J. Geosci. Educat.*, 62: 550-559.
- Terry, J.P. and T.F.M. Chui, 2015. Evaluating the fate of freshwater lenses on atoll islands after eustatic sea-level rise and cyclone-driven inundation: A modelling approach. *Contemporary Pacific*.
- Terry, J.P. and R.R. Thaman, 2008. *Physical Geography of Majuro and the Marshall Islands*. 1st Edn., Suva: Faculty of Oceans and Islands, University of the South Pacific.
- UNESCO, 2015. *Education For All 2000-2015: Achievements and Challenges*. Paris UNESCO Publishing.
- UNITAR, 2013. *Integrating Climate Change in Education at Primary and Secondary Level*. [https://www.uncclearn.org/sites/default/files/inventory/resource\\_guide\\_on\\_integrating\\_cc\\_in\\_education\\_primary\\_and\\_secondary\\_level.pdf](https://www.uncclearn.org/sites/default/files/inventory/resource_guide_on_integrating_cc_in_education_primary_and_secondary_level.pdf)
- United Nations, 2016. *Sustainable Development Goals*.
- Veramu, J., 2018. COP23 and beyond. <http://www.fjitime.com/story.aspx?id=432053>
- Viviane, M.J.R., 2008. Forging the links between distributed leadership and educational outcomes. *J. Educ. Administrat.*, 46: 241-256. DOI: 10.1108/09578230810863299
- Wilkinson, D. and P. Birmingham, 2003. *Using Research Instruments: A Guide for Researchers*. RoutledgeFalmer, London.
- Wise, S.B., 2010. Climate change in the classroom: Patterns, motivations and barriers to instruction among colorado science teachers. *J. Geosci. Educat.*, 58: 297-309.