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THE ROLE OF ENERGY SUPPLY IN THE SHAPING OF DEVELOPMENT  
PROSPECTS IN SMALL AND ISOLATED PACIFIC ISLAND COMMUNITIES –  
PAST, PRESENT AND FUTURE.

A THESIS PRESENTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

DEVELOPMENT STUDIES

AT MASSEY UNIVERSITY, MANAWATU CAMPUS, NEW ZEALAND

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## ABSTRACT

The thesis examines the way that energy supply has influenced directly or indirectly the transformation of society in Niue and Tuvalu from the time before the arrival of palagi (Europeans) to the present day. Of particular interest is the vulnerability that this reliance creates in terms of the risk to people's wellbeing. Most of New Zealand's South Pacific neighbours have to import energy in the form of oil products. In the case of Niue and Tuvalu, over 90% of their energy is imported, largely paid for through aid from overseas donors. Like New Zealand, people in both countries rely on energy to maintain their livelihoods and lifestyles. There is near 100% electrification and vehicle ownership is high and government and commercial enterprises that provide services and employment rely on continuous and affordable energy, the supply of which is highly vulnerable to economic and political pressures beyond their control, a situation not expected to improve. The thesis addresses four questions: how and why this situation has come about, would these two communities be able to adapt to a much reduced or changed energy supply, what steps are being taken to reduce this dependency before a crisis occurs and whether these steps are likely to be effective.

The research used the sustainable livelihoods approach to develop an integrated research methodology including field methods and a novel, systematic form of analysis. Field research methods involved interviews, conversations and observation. The results of the research are set out in narrative form that reviews changes to livelihoods in Niue and Tuvalu over time from the arrival of palagi to the present day. The narrative is followed by an original sustainable livelihoods analysis, the output of which is a series of livelihood profiles including livelihoods asset pentagons that illustrate changes in livelihood assets. A parallel series of "livelihood energy pentagons" were developed to demonstrate the influence of energy on livelihoods. The same method of analysis is used to analyse an "energy-deprived" future scenario, postulated in order to illustrate the impact on livelihoods in Niue and Tuvalu should the supply of oil-based fuels become severely constrained.

The narrative and the analyses show that the role of energy has changed from having an essential role although limited in form, in supporting people's traditional livelihoods to one that enables the full spectrum of services on which contemporary livelihoods rely in Niue and Tuvalu. The analysis of the energy-deprived scenarios underlines this reliance by demonstrating the serious and negative impact on contemporary society should imported fuel supplies be seriously disrupted. Current plans by the two governments to reduce reliance and imported fuel supplies are reviewed and this thesis concludes that while proposed measures go some way to mitigating the impact of a fuel supply disruption, the consequences of such a disruption will still be severe. A recommendation is made that both governments prepare strategic action plans that specifically address fuel supply disruption by emphasising a focus on endogenous rather than exogenous energy sources.

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## TABLE OF CONTENTS

<b>CHAPTER 1: INTRODUCTION</b> .....	<b>1</b>
1.1 THE ENERGY-DEVELOPMENT NEXUS .....	3
1.2 THE RESEARCH QUESTIONS .....	5
1.3 APPROACHES TO THE RESEARCH: SUSTAINABLE LIVELIHOODS AND HUMAN DEVELOPMENT .....	6
1.4 ENERGY AND ENERGY TECHNOLOGIES .....	8
1.5 THESIS STRUCTURE .....	10
<b>CHAPTER 2: THE ENERGY-DEVELOPMENT NEXUS</b> .....	<b>14</b>
2.1 INTRODUCTION.....	14
2.2 A MODEL OF “DEVELOPMENT”: BRITISH INDUSTRIALISATION – 1750 TO 1960.....	15
2.2.1 Phase 1: The British “Industrial Revolution” – 1750 to 1870.....	15
2.2.2 Phase 2: Consolidation and Disruption – 1870 to 1960 .....	18
2.2.3 Industrialisation, Globalisation and Colonisation in the Context of Niue and Tuvalu.....	20
2.3 THE “AGE OF DEVELOPMENT” – 1950 TO 1980.....	22
2.3.1 The Development “Model” – Industrialisation and Modernisation .....	23
2.4 THE “AGE OF SUSTAINABLE DEVELOPMENT” – 1980 ONWARDS.....	25
2.5 CHAPTER SUMMARY AND DISCUSSION.....	36
<b>CHAPTER 3: THE SUSTAINABLE LIVELIHOODS APPROACH: LINKING CONCEPTUAL FRAMEWORK, METHODOLOGY AND METHODS</b> .....	<b>38</b>
3.1 INTRODUCTION.....	38
3.2 THE SUSTAINABLE LIVELIHOODS APPROACH .....	39
3.2.1 History and Development.....	39
3.2.2 The DIFID Sustainable Livelihoods Framework .....	42
3.2.3 Livelihood assets.....	44
3.2.4 The Vulnerability Context .....	47
3.2.5 Transforming structures and processes .....	49
3.2.6 Livelihood strategies .....	49
3.2.7 Livelihood outcomes .....	50

---

3.2.8	Energy and Sustainable Livelihoods.....	51
3.2.9	Criticisms of the Sustainable Livelihoods Approach .....	55
3.3	RESEARCH METHODS.....	58
3.3.1	Research Ethics.....	60
3.3.2	Primary Research Methods .....	60
3.3.3	Field Visit Programme .....	63
3.3.4	Methods and Processes of Analysis.....	67
3.4	REFLECTIONS ON THE USE OF THE SUSTAINABLE LIVELIHOODS APPROACH TO DESIGN A METHODOLOGY .....	68
<b>CHAPTER 4: TRANSFORMATION OF SMALL PACIFIC ISLAND SOCIETIES FROM PRE- PALAGI TO MODERNITY: PART 1- NIUE.....</b>		<b>71</b>
4.1	INTRODUCTION .....	71
4.2	POLITICAL AND ECONOMIC PROFILE.....	72
4.3	TRADITIONAL SOCIETY – THE PRE-PALAGI ERA: CIRCA 500 AD TO 1830 .....	74
4.4	THE TRADER AND MISSIONARY ERA – THE FIRST PHASE OF TRANSFORMATION: 1830 TO 1901.....	77
4.5	THE COLONIAL ERA: STAGNATION AND TRANSFORMATION - 1901 TO 1974 .....	80
4.5.1	Indifference and Stagnation- 1901 to 1950.....	81
4.5.2	The First Signs of Change – the 1950s .....	83
4.5.3	Transformation – the Development Programme 1960 to 1974.....	85
4.5.4	The Path to Independence .....	89
4.6	CONTEMPORARY NIUE - 1974 TO THE PRESENT DAY .....	89
4.6.1	Contemporary society.....	90
4.6.2	Population decline .....	94
4.6.3	Economic Development.....	96
4.6.4	Livelihood services .....	100
4.7	CHAPTER SUMMARY AND DISCUSSION .....	111
<b>CHAPTER 5: TRANSFORMATION OF A SMALL ISLAND SOCIETY FROM “PRE-PALAGI” TO MODERNITY: PART 2- TUVALU. ....</b>		<b>115</b>
5.1	INTRODUCTION .....	115

---

---

5.2	POLITICAL AND ECONOMIC PROFILE .....	117
5.3	THE PRE-PALAGI ERA CIRCA 1400 TO 1820 .....	119
5.4	PALAGI AND PASTORS – THE TRADER AND MISSIONARY ERA: 1820 TO 1901 .....	122
5.5	THE COLONIAL ERA: NEGLECT, WAR AND TRANSFORMATION - 1892 TO 1974 .....	125
5.5.1	A “Neglected Backwater” – 1892 to 1941 .....	125
5.5.2	War – 1942 to 1945 .....	129
5.5.3	The First Signs of Change – 1950s and 1960s .....	130
5.5.4	Towards Secession and Independence .....	132
5.6	CONTEMPORARY TUVALU - 1978 TO THE PRESENT DAY .....	133
5.6.1	Contemporary society .....	135
5.6.2	Economic development .....	140
5.6.3	Livelihood Services .....	142
5.7	CHAPTER SUMMARY AND DISCUSSION .....	155
<b>CHAPTER 6: USING THE SUSTAINABLE LIVELIHOODS APPROACH AS A METHOD OF ANALYSIS. ....</b>		<b>159</b>
6.1	INTRODUCTION .....	159
6.2	TRANSFORMATION AND LIVELIHOOD ASSETS .....	161
6.2.1	Pre-palagi Era .....	166
6.2.2	The Trader and Missionary Era .....	172
6.2.3	The Colonial Era –the 1950s .....	179
6.2.4	The Contemporary Era .....	185
6.2.5	Summary .....	193
6.3	THE VULNERABILITY CONTEXT .....	196
6.3.1	Pre-palagi Era .....	197
6.3.2	Trader and Missionary Era .....	199
6.3.3	Colonial Era – the 1950s .....	201
6.3.4	The Contemporary Era .....	203
6.3.5	Summary .....	205
6.4	CHAPTER DISCUSSION .....	206

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<b>CHAPTER 7: USING THE SUSTAINABLE LIVELIHOODS APPROACH TO ANALYSE AN “ENERGY-DEPRIVED” SCENARIO.....</b>	<b>208</b>
7.1 INTRODUCTION .....	208
7.2 ENERGY-DEPRIVED SUPPLY SCENARIOS.....	209
7.2.1 Niue .....	209
7.2.2 Tuvalu.....	213
7.3 THE IMPACTS OF CONSTRAINED ENERGY AS PERCEIVED BY INFORMANTS.....	216
7.4 TRANSFORMATION AND LIVELIHOOD ASSETS.....	217
7.4.1 Transforming Structures and Processes .....	219
7.4.2 Livelihood Strategies and Outcomes .....	219
7.4.3 Livelihood assets .....	222
7.5 THE VULNERABILITY CONTEXT .....	226
7.5.1 Niue .....	227
7.5.2 Tuvalu.....	227
7.6 NATIONAL STRATEGIES AND PLANS.....	230
7.6.1 Energy Related Strategies.....	230
7.6.2 Disaster Risk Management.....	233
7.6.3 National Strategies and Plans – a Critique .....	234
7.7 CHAPTER SUMMARY .....	235
<b>CHAPTER 8: THESIS REVIEW AND CONCLUSIONS .....</b>	<b>238</b>
8.1 USING THE SUSTAINABLE LIVELIHOODS APPROACH AS A METHOD OF ANALYSIS ...	238
8.2 THE RESEARCH QUESTIONS .....	239
8.2.1 How has energy supply shaped the development of Niue and Tuvalu? .....	239
8.2.2 What are the risks to the future development of Niue and Tuvalu from disruption to energy supply? .....	241
8.2.3 What measures are being taken to mitigate these risks? .....	242
8.2.4 Are those measures likely to be effective? .....	242
8.3 A WAY FORWARD.....	242
8.4 SOME FINAL REFLECTIONS.....	244

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<b>REFERENCES:</b> .....	<b>247</b>
<b>APPENDIX 1: QUESTION PORTFOLIOS</b> .....	<b>262</b>
NIUE FIELD VISITS .....	262
TUVALU FIELD VISITS.....	263
<b>APPENDIX 2: SUSTAINABLE LIVELIHOODS ANALYSIS</b> .....	<b>264</b>
LIVELIHOOD ASSET AND ENERGY PROFILES.....	264
<b>APPENDIX 3: SUSTAINABLE LIVELIHOODS ANALYSIS – THE ENERGY DEPRIVED SCENARIO</b> .....	<b>305</b>
LIVELIHOOD ASSET AND ENERGY PROFILES.....	305

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## LIST OF FIGURES AND TABLES

Figure 1 – HDI and Energy Consumption in Britain – 1760 to 1880.....	17
Figure 2 – HDI and Energy Consumption in Britain – 1880 to 1960.....	19
Figure 3 – The Human Development Index and Primary Energy Demand per Capita 2002.....	28
Figure 4 – Correlations between Energy Consumption per Capita and Life Expectancy, Infant Mortality, Illiteracy and Total Fertility Rate.....	30
Figure 5 – Energy and Sustainable Development.....	31
Figure 6 – The DFID Sustainable Livelihoods Framework.....	43
Figure 7 – Asset Pentagon (1): an example of a rural livelihood.....	45
Figure 8 – Asset Pentagon (2): an example of the effects in a reduction in access to natural resources ...	46
Figure 9 – A Conceptual Model Linking Energy and Livelihood Outcomes.....	54
Figure 10 – Research Information: Sources and Information Flows .....	59
Figure 11 – Process of Analysis.....	66
Figure 12 – Map of Niue.....	73
Figure 13 – Population of Niue: 1900 to 1976.....	88
Figure 14 – Liku Village.....	91
Figure 15 – Population of Niue: 1971 to 2010.....	95
Figure 16 – Niue: Senile Coconut Plantation .....	97
Figure 17 – Niue: NPC Power Station.....	102
Figure 18 – Niue: Temporary Power House (following 2006 fire).....	103
Figure 19 – PV Array at the Niue Hospital .....	104
Figure 20 – 200 kWp PV Array at the Niue Power Station.....	105
Figure 21 – “Ship day” in Niue .....	110
Figure 22 - Map of Tuvalu.....	116
Figure 23 - Tuvalu: Estimated Population by Island 1911 to 1979.....	127
Figure 24 - Tuvalu: Population by Island from 1979 to 2012.....	134
Figure 25 – Tuvalu: View towards the Airport with Government Building in the Background.....	135
Figure 26 – Tuvalu: “Evening Sports” on the Airport Runway .....	136
Figure 27 – Tuvalu: The “Taiwanese Gardens”.....	138
Figure 28 – Tuvalu: The Fogafale Power Station with Airport Runway in Foreground.....	145
Figure 29 – Tuvalu: “Plane Day” at Funafuti International Airport .....	154
Figure 30– Process of Analysis.....	160
Figure 31 – The Resilient Livelihood Asset Pentagon.....	164
Figure 32 – Livelihood Strategies and Outcomes: Pre-palagi Era- Niue.....	169
Figure 33 – Livelihood Strategies and Outcomes: Pre-palagi Era- Tuvalu.....	170

---

Figure 34 – Livelihood Pentagons: Pre-palagi era Niue .....	171
Figure 35 – Livelihood Pentagons: Pre-palagi Era Tuvalu.....	172
Figure 36 – Livelihood Strategies and Outcomes: Trader and Missionary Era – Niue .....	175
Figure 37 – Livelihood Strategies and Outcomes: Trader and Missionary Era – Tuvalu.....	176
Figure 38 – Livelihood Pentagons: Trader and Missionary Era Niue.....	177
Figure 39 – Livelihood Pentagons: Trader and Missionary Era Tuvalu .....	178
Figure 40 – Livelihood Strategies and Outcomes: Colonial Era (1950s) – Niue.....	181
Figure 41– Livelihood Strategies and Outcomes: Colonial Era (1950s) – Tuvalu.....	182
Figure 42 – Livelihood Pentagons: Colonial Era Niue .....	184
Figure 43 – Livelihood Pentagons: Colonial Era Tuvalu .....	185
Figure 44 – Livelihood Strategies and Outcomes: Contemporary Era – Niue .....	188
Figure 45 – Livelihood Strategies and Outcomes: Contemporary Era – Tuvalu.....	189
Figure 46 – Livelihood Pentagons: Contemporary Era Niue.....	191
Figure 47 – Livelihood Pentagons: Contemporary Era Tuvalu .....	192
Figure 48 – Livelihood Asset Pentagons over time : Pre-palagi to Contemporary Eras .....	194
Figure 49 – Livelihood Energy Pentagons over time : Pre-palagi to Contemporary eras .....	195
Figure 50 – Vulnerability Profile.....	197
Figure 51 – Vulnerability Profiles: Pre-palagi Era .....	198
Figure 52 – Vulnerability Profiles: Trader and Missionary Era.....	200
Figure 53 – Vulnerability Profile: Colonial Era .....	202
Figure 54 – Vulnerability Profiles: Contemporary Era.....	204
Figure 55 – Livelihood Strategies and Outcomes: Niue – Energy Deprived Scenario.....	220
Figure 56 – Livelihood Strategies and Outcomes: Tuvalu – Energy Deprived Scenario .....	221
Figure 57 – Livelihood Asset Pentagons: Contemporary versus Energy- Deprived – Niue.....	224
Figure 58 – Livelihood Energy Pentagons: Contemporary versus Energy- Deprived – Niue .....	224
Figure 59 – Livelihood Asset Pentagons: Contemporary versus Energy- Deprived – Tuvalu .....	225
Figure 60 – Livelihood Energy Pentagons: Contemporary versus Energy- Deprived – Tuvalu .....	226
Figure 61 – Vulnerability Profiles: Contemporary versus Energy- Deprived – Niue.....	228
Figure 62 – Vulnerability Profiles: Contemporary versus Energy- Deprived – Tuvalu .....	229
Table 1: Examples of Linkages between Energy and the MDG .....	33
Table 2: Schedule of Field Visits .....	63
Table 3: Informant Profiles by Age and Sex– Niue.....	64
Table 4: Informant Profiles by Age and Sex– Tuvalu.....	64
Table 5: Age Profile of Population as Percentage aged 18 and over – Niue and Tuvalu .....	64
Table 6: Occupation Profile of Informants – Niue and Tuvalu .....	65
Table 7: Niue Merchandise Trade – 1922 to 1971.....	86

---

---

Table 8: Tuvalu – Estimated Population by Island over the 19 <sup>th</sup> Century.....	120
Table 9: Tuvalu Imported Energy Consumption – 1984 to 2009.....	143
Table 10: Livelihood Capitals.....	163
Table 11: Transforming Structures and Processes – Pre-palagi Era.....	167
Table 12: Transforming Structures and Processes – Trader and Missionary Era.....	174
Table 13: Transforming Structures and Processes – Colonial Era 1950s.....	180
Table 14: Transforming Structures and Processes – Contemporary Era.....	187
Table 15: Niue – Energy Supply Imports and Consumption Data.....	210
Table 16: Niue – PV Generation Plant.....	210
Table 17: Tuvalu – Imported Energy Supply and Consumption Data.....	213
Table 18: Tuvalu – PV Generation plant.....	213
Table 19: Tuvalu – Proposed PV Generation Plant.....	214
Table 20: Transforming Structures and Processes: Energy-Deprived Scenario.....	218
Table 21: National Strategies for Sustainable Development – Niue, Tuvalu, Cook Islands, Kiribati and Tokelau – Energy Related Strategies.....	231
Table 22: Livelihood Asset Analysis – Niue: Pre-palagi Era.....	265
Table 23: Livelihood Asset Analysis – Niue: Trader and Missionary Era.....	269
Table 24: Livelihood Asset Analysis – Niue: Colonial Era (to 1950s).....	273
Table 25: Livelihood Asset Analysis – Niue: Contemporary Era.....	278
Table 26: Livelihood Asset Analysis – Tuvalu: Pre-palagi Era.....	285
Table 27: Livelihood Asset Analysis – Tuvalu: Trader and Missionary Era.....	288
Table 28: Livelihood Asset Analysis – Tuvalu: Colonial Era (to 1950s).....	292
Table 29: Livelihood Asset Analysis – Tuvalu: Contemporary Era.....	297
Table 30: Livelihood Asset Analysis – Niue: Energy-Deprived Scenario.....	306
Table 31: Livelihood Asset Analysis – Tuvalu: Energy-Deprived Scenario.....	312

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## ACRONYMS

ADB:	Asian Development Bank
ADFD:	Abu Dhabi Fund for Development
AUD:	Australian Dollar
CEDOL:	Commonwealth Education Online
CFL:	Compact fluorescent lamp.
DFID:	Department for International Development (United Kingdom)
EEZ:	Exclusive economic zone
ESDP:	Energy Sector Development Project.
GDP:	Gross Domestic Product
GP:	General Practitioner (medical).
HDI:	Human Development Index
HIES:	Household Income and Expenditure Survey.
IMF:	International Monetary Fund.
Kg:	Kilogramme
LDC:	Least developed country
LMS:	London Missionary Society
LPG:	Liquefied Petroleum Gas
MDG:	Millennium Development Goals
MFAT:	Ministry of Foreign Affairs and Trade (New Zealand).
MOFA:	Ministry of Foreign Affairs (Japan)
NGO:	Non-Governmental Organisation.
NZAID:	New Zealand Agency for International Development.
NZD:	New Zealand Dollar
ODA:	Official Development Assistance
PRA:	Participatory Rural Appraisal.
PV:	Photovoltaic (often referred to as solar generation).
REEEU:	Renewable Energy and Energy Efficiency Unit (unit of TEC).
RRA:	Rapid Rural Appraisal
SAP:	Structural adjustment programmes.
SDG:	Sustainable Development Goals
SOPAC:	Applied Geoscience and Technology Division (SOPAC Division of SPC)
SPC:	Secretariat of the Pacific Community.
TEC:	Tuvalu Electricity Corporation
TKII:	Te Tekakeega II (the (Tuvalu) National Strategy for Sustainable Development.
TMTI:	Tuvalu Maritime Training Institute
UN:	United Nations
UNCTAD:	United Nations Conference on Trade and Development.
UNDP:	United Nations Development Programme
USD:	United States Dollar.
USP:	University of the South Pacific
USPEC:	University of the South Pacific Extension Campus
WCED:	World Commission on Environment and Development
WHO:	World Health Organisation
WST:	Samoan Tala.
\$:	New Zealand Dollar
\$A:	Australian Dollar
\$US:	United States Dollar
€:	Euro
¥:	Yen

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## ENERGY UNITS AND FACTORS

### Energy units used in this thesis:

J:	Joule: unit of energy kJ = 1,000 J MJ = 1,000,000 J GJ = 1,000 MJ
kWh:	kilowatt-hour: unit of energy used in electrical industry (1 kWh = 3.6 MJ). MWh = 1,000 kWh GWh = 1,000 MWh
TOE:	Tonnes of Oil Equivalent (42.6 GJ = 11.83 MWh)
W:	Watt: unit of power kW = 1,000 W MW = 1,000 kW GW = 1,000 MW
Wp:	Watt peak: unit of power used in PV and wind generation sector. kWp = 1,000 Wp.

### Energy content factors (calorific values) used for various fuels:

Diesel oil:	45.69 MJ/kg	38.45 MJ/litre
Petrol (gasoline):	46.96 MJ/kg	35.25 MJ/litre
Kerosene:	46.19 MJ/kg	37.26 MJ/litre
LPG:	49.51 MJ/kg	26.54 MJ/litre

Note: all the above are gross calorific values.

Source: New Zealand Energy Data File 2012 (MED, 2012, p. 159).