

REPUBLIC OF VANUATU

STATE OF THE ENVIRONMENT REPORT 2022

Ministry of Climate Change Adaptation,
Meteorology and Geo-hazards,
Environment,
Energy and Disaster Management, Government of Vanuatu.



SPREP Library – Cataloguing in Publication data
Republic of Vanuatu State of the Environment report 2022.

Apia, Samoa : SPREP, 2023.

288p, Size 29cm

ISBN: 978-982-04-1177-7 (print)

978-982-04-1179-1 (ecopy)

1. Environmental impact analysis – Republic of Vanuatu.
2. Environmental Policy – Republic of Vanuatu.
3. Conservation of natural resources – Republic of Vanuatu.

I. Pacific Regional Environment Programme (SPREP).

II. Title.

333.720959 5

Cover photo: © Seth Agland

Inside Cover photo: DEPC

Other photos: Unless otherwise acknowledged, all photographs were taken by were taken by the DEPC.

Designed by: www.addiestudio.com



PO Box 240
Apia, Samoa
T: +685 21929
E: sprep@sprep.org
W: www.sprep.org

Our vision:

**A resilient Pacific environment sustaining our livelihoods
and natural heritage in harmony with our cultures.**

REPUBLIC OF VANUATU

STATE OF THE ENVIRONMENT REPORT 2022





Honourable Minister

JOHN DAMAHSING SALONG

Ministry of Climate Change Adaptation, Meteorology,
Geo-Hazards, Environment, Energy and Disaster Management

Message from Vanuatu

Our Environment is our Home. Our Islands are our Heritage. Our people are the keepers of our treasured past, and the Voice of our Future.

It is with pleasure that we celebrate the first State of the Environment Report for our beloved Vanuatu. I am particularly honoured to share this report on behalf of the people and the Government.

The State of the Environment Report is a testament to the efforts of all the Vanuatu people, our traditional leaders, our communities from Port Vila, Luganville and all the remote islands and villages throughout the Archipelago. It is a highlight of the achievements made but also a stark reminder of the vast challenges that we face as we prepare ourselves to face the calamities brought about by climate change – the biggest moral and ethical challenge of our time.

Our environment is one of the three key pillars in our People's Plan for a sustainable Vanuatu. The State of the Environment Report is a key requirement, mandated in the Environmental Protection and Conservation Act CAP 283. It has been developed through consultations with local experts in various fields from the Kaljoral Senta, Health, Public Works, Education, Statistics Office, Meteorology, Climate Change, Environment, the Agriculture, Forestry, Fisheries, Biosecurity, Civil Society and the Private Sector. The various sectors

are connected by the environment and I would like to commend the Department of Environment, as the national Government body that has coordinated this Report. As the minister responsible for the Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Natural Disaster Management Office, I acknowledge the relevant ministries for their support and the information and data that enabled the production of this report.

I would also like to acknowledge the support provided by our regional partner, the Secretariat for the Pacific Regional Environment Programme, throughout the process.

The State of the Environment Report touches on issues that are very close to my heart, and I hope to the hearts of all ni-Vanuatu, both in the country and throughout the world. Our ancestral languages, traditional knowledge, and our plants and animals are all being affected by the choices that we make. It is inevitable that changes will happen to our environment and to our society, as we pursue a progressive agenda to benefit our people. All those in authority must do their best to ensure that the changes will not adversely affect the values and the natural assets that have given us our identity.

I encourage all Vanuatu people to read this State of the Environment Report and to do what they can to help Vanuatu be the best place on Earth.

Mr. Sefanaia Nawadra
Director General
SPREP



Message from SPREP

Vanuatu is the twelfth Pacific island country to develop their state of environment (SOE) report. This is a milestone for the Pacific islands region and for SPREP member countries. The SOE is a testament to the progress being achieved in Vanuatu as it edges closer to its national sustainable development plan target year of 2030.

The state of environment reports across the Pacific provide us with the latest information on our ecosystems. The state of our biodiversity, forests, coral reefs, mangroves and water quality are key parts of these reports. They also highlight impacts such as our greenhouse gas emissions, our energy use, wastes generated per capita and the number of species becoming extinct or critically endangered. Our response to these challenges, through legal support, policies and management regime, is vital and can save or lose a species, a forest or a reef. Partnership and cooperation are keys to this response and this is where we need to value the wisdom of our ancient cultures and respect the knowledge that has been passed from generation to generation. Engaging with our traditional leaders and our knowledge holders should be prioritised. We value their contribution and their role as custodians of these resources. And we must ensure that their inputs are reflected in the programmes and outcomes of all conservation and management efforts.

Vanuatu's SOE Report is the first since the Environmental Protection and Conservation Act was enacted in 2002. It is an important document for the Government and the people of Vanuatu and the process must regularly be reviewed and updated, as part of our duty-of-care to the environment and to the future generations of our islands. SPREP is very pleased to be able to assist Vanuatu in the preparation of this report. The SOE report provides recommendations that encourage development partners to assist with their implementation. SPREP stands with Vanuatu in our joint quest for a secured future for all ni-Vanuatu and Pacific peoples. We commend the work by the Department of Environment Management and Conservation in achieving this incredible milestone. We urge all our partners and the donor communities to read the SOE and to see where they can assist Vanuatu.

Executive Summary

The State of Environment Report provides the latest check on the threats, the state, and the impacts on Vanuatu's environment and the response in mitigating the threats and managing human actions. The report is a legal requirement under the Environmental Management and Conservation Act No. 12 of 2002, which has been amended to the Environmental Protection and Conservation Act [CAP 283]. The assessment is on seven thematic areas and thirty-five indicators and sub-indicators. The process for the assessment looks at the drivers, pressure, state, impact and the response to each of the indicators. National consultations with key local stakeholders provided the data and information, as well as validation of the information that is presented in the State of Environment Report.

Environmental Drivers and Pressures

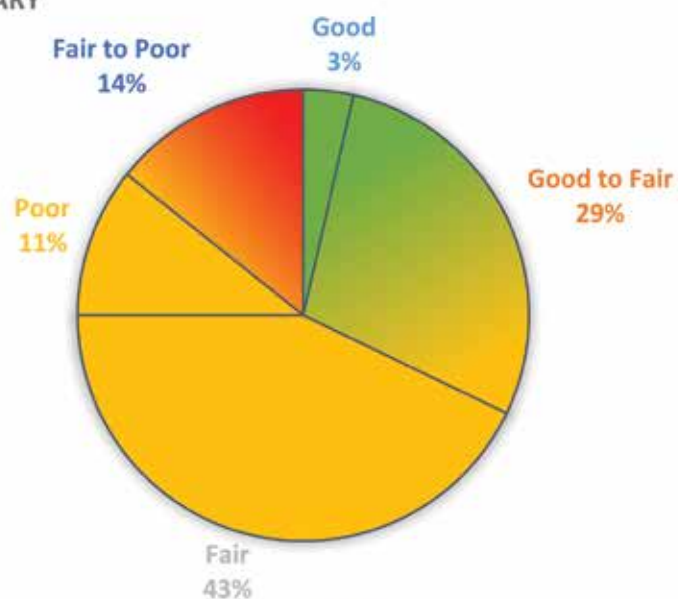
There are a number of drivers which generate pressure on Vanuatu's environment. The nation's population has quadrupled in the last 100 years – from less than 70,000 in the 1920s, to more than 300,019 people in the 2020 mini-Census Report. This impacts Vanuatu's environment through a variety of mechanisms, including through expansion of urban areas, habitat destruction, increased pressure on natural resources (particularly drinking water and marine resources), and increased waste generation and pollution. The nation's gross domestic product has risen from \$283,275 Vatu per capita in 2010 to \$351,633 in 2020. This has generated opportunities for consumption of luxury imported goods such as cars and motorbikes, and processed foods (and associated plastic packaging). With a total land area of only 12,200 km², Vanuatu is one of the world's most vulnerable nations to the impacts of global climate change. While the precise local impacts are not yet known, they are likely to include sea level rise, changes in sea surface temperature and pH (which inhibit growth of coral), changes in the frequency and severity of tropical cyclones, and changes in air temperature and rainfall patterns. These high-level drivers of change underpin activities that place pressure on the environment and natural resources, including pollution, inadequate waste management, invasive alien species, urban development and extraction of marine resources.

The General State of Vanuatu's Environment

Vanuatu's overall environment is in a fair state. The assessment of the indicators found 14% are in a fair to poor state, 43% in fair, 29% in good to fair, 3% in good and 11% in a poor state. The efforts by communities, Government and non-governmental organisations have resulted in the Biodiversity, Marine and Coast and Environmental Governance to be in a better shape than all of the other thematic areas. The two thematic areas of concern are the Built Environment and Culture and Heritage, highlighting the impact of population growth and urbanisation. Waste and sanitation management, sustainable energy supply and water and food security are serious challenges to a growing population. The increased migration to urban centres has led to abandonment of many of the cultures and traditions that have been a stronghold of ni-Vanuatu society. Indigenous languages are being lost due to migration, inter-marriage and the growing influence of the three foreign languages (English, Bislama and French).

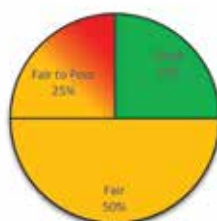
The environmental trend is stable or improving with the majority of the improvement in the Built Environment and Biodiversity. Unfortunately, the impact of climate change is contributing to a negative trend in coral reefs, which is exacerbated by the over-exploitation of marine resources. Pressure from unmanaged sanitation and waste in urban areas is resulting in contaminated and polluted coastal waters. The Culture and Heritage indicators showed a mixed trend with some improvements in the documentation and preservation of some of the indigenous languages, as well as the registration of sites of historical importance. The level of confidence on the data and information used for the SOE remains at the medium level, indicating that there is still some way to go to ensure high quality data are available for future assessments.

SOE 2022 - STATE SUMMARY



State of the seven thematic areas:

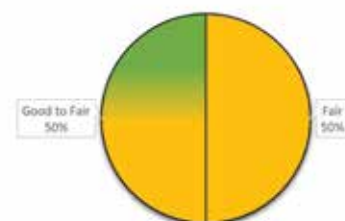
Atmosphere & Climate State



LAND STATE



Marine and Coast State



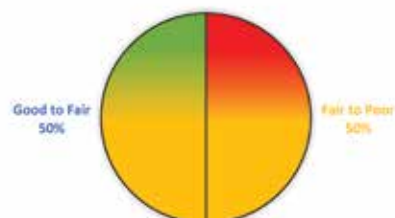
Built Environment State



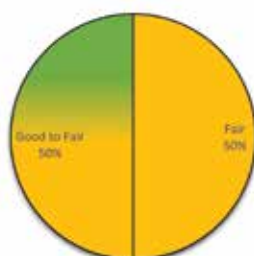
CULTURE AND HERITAGE STATE



ENVIRONMENTAL GOVERNANCE



Biodiversity State



Recommendations

Specific recommendations are included in each of the SOE Themes. Key overarching recommendations that capture many of the common themes throughout the SOE are presented.

National State of Environment Reports to be produced every five-years

The stakeholders recognise that a regular assessment within a five-year timeframe is preferable to the current stipulation of 10 years under the Act, as this will provide an earlier health check and interventions to protect the environment.

Establish a national meta-data hub to harvest data and metrics relating to the National Sustainable Development Plan 2016-2030.

There is a need for a national data-hub or a meta-database that allows government agencies to upload and share information within a secure environment. This will benefit future SOE and SDP reporting. A national framework needs to be developed and approved to mandate agencies and ministries to collaborate and share resources.

Resource management and monitoring.

Vanuatu's resources are being challenged by over-exploitation, habitat degradation and by climate change through global warming and exacerbating climate extremes. The SOE recognises that much more needs to be done to enumerate the state and the trends of Vanuatu's resources and improve the level of confidence in the data.

Identify capacity building needs and opportunities.

A capable workforce that is well resourced is required to achieve many of the policies and organisational goals. Building local capacity is important, which is an ongoing process that will require specialised training either in-house, externally at tertiary institutions, or it may require workshops and on-the-job training. Regular reviews of organisation and individual capacity needs should be encouraged, and any deficits should be immediately addressed.

Explore the feasibility of harmonising a national registry on community engagement in the areas of resource conservation and management.

Organisations are often working in silos, despite the fact that the outcomes are similar and the modus operandi are shared, such as valuing community inputs and recognition of culture and traditional systems. There is a need to harmonise community engagement and external assistance through a national coordinated approach.

Inter-agency collaboration.

The aforementioned recommendation on harmonising a national registry can only be achieved through trust and having a strong collaboration amongst the various government agencies. The Government could provide the framework through directives and legislating ministries to spearhead collaborations, but the hurdle continues to be the rapport between individuals.

Strengthen co-management between the formal and the traditional systems.

Despite the recognition of traditional systems in the Constitution and various Government legislation and policies, there is still some mistrust between the traditional system and the Government. Within the area of resource management, it provides the opportunity for the marrying of the two systems for the benefit of the community. Trust, assurance and openness are important attributes that communities are looking for from the Government.

Strengthen and Value Partnerships.

The SOE has highlighted some of the deficiencies that the Government and communities are faced with. One of these deficiencies is the lack of resources to rebuild, repair or maintain the infrastructure at the local, provincial and national levels. One of the solutions is to strengthen the partnership of local organisations, including government agencies, with development partners and the private sector, to identify specific areas where support is most needed.

Sustainable financing.

Underpinning many of the development deficiencies within the country is the lack of financial resources. Projects have contributed to improving some of the deficiencies, but as these are often short-term, the benefits are also limited. Developing a sustainable funding plan could be a solution in helping to resolve the country's environmental challenges.

CONTENTS:

Message from Vanuatu	4
Message from SPREP	5
Executive Summary.....	6
Acknowledgements.....	12
Acronyms	12
PART ONE: INTRODUCTION.....	15
1.0 Purpose of the SOE Report	18
1.1 Target Audience for the SOE Report.....	18
1.2 Approach to the SOE Report	19
1.3 Comparison of the 2022 SOE with previous Environmental Reports	20
1.4 Themes for the SOE Report.....	23
1.5 Reader's Guide to the SOE Report	26
PART TWO: DRIVERS AND PRESSURES ON VANUATU'S ENVIRONMENT	30
2.1 Drivers	31
2.2 Environmental Pressures.....	35
PART THREE: STATE OF VANUATU'S ENVIRONMENT	38
THEME 1: ATMOSPHERE AND CLIMATE	39
Atmosphere and Climate Overview and Highlights	40
3.1.1 Greenhouse Gas (GHG) emissions	42
3.1.2 Ozone Depleting Substances.....	48
3.1.3 Physical Climate Trends	52
3.1.4 Climate-related disaster loss	59
THEME 2: LAND	67
Land Overview and Highlights.....	68
3.2.1 Land Changes.....	71
3.2.2 Forests.....	77
3.2.3 Agriculture	83

THEME 3: MARINE and COAST	88
Marine and Coast Overview and Highlights.....	89
3.3.1 Coral Reef and Marine Resources.....	93
3.3.2 Fisheries	97
3.3.3 Coastal Water Quality	106
3.3.4 Marine Protected Areas	113
THEME 4: BIODIVERSITY	121
Biodiversity Overview and Highlights	122
3.4.1. IUCN Red List Species.....	126
3.4.2 Wetlands.....	145
3.4.3 Environmental Invasive Species.....	155
3.4.4 Conservation and Protected Areas.....	165
THEME 5: BUILT ENVIRONMENT	171
Built Environment Overview and Highlights	172
3.5.1 Renewable Energy	176
3.5.2 Waste Management	185
3.5.3 Sanitation	195
3.5.4 Potable Water	199
THEME 6: CULTURE AND HERITAGE	205
3.6.1 Indigenous Languages.....	209
3.6.2 Traditional Knowledge	214
3.6.3 Traditional Productions.....	218
3.6.4 Food Production and Consumption	222
3.6.5 Sites of National Significance	225

THEME 7: ENVIRONMENTAL GOVERNANCE.....	228
Environmental Governance Overview and Highlights	229
3.7.1 Multilateral Environmental Agreements	232
3.7.2 Environmental Impact Assessments.....	236
3.7.3 Compliance and Prosecution.....	242
3.7.4 Environmental Funding Commitment.....	246
PART FOUR: SUMMARY AND RECOMMENDATIONS	253
State of the key thematic areas	256
Recommendations	258
ANNEX 1 – List of Contributors	261
ANNEX 2 – MEAs Reporting.....	263
ANNEX 3 – Languages of Vanuatu	267
ANNEX 4 – Resident Land Bird Species of Vanuatu	271
ANNEX 5 – Vanuatu’s Endangered Species	273
ANNEX 6 – Vanuatu’s Vulnerable Species	274
ANNEX 7 – Tabu, Protected and Community Conservation Areas	277
ANNEX 8 – Vanuatu Species of National Significance	280
ANNEX 9 – Vanuatu Freshwater Biodiversity fauna	283

Acknowledgements

We acknowledge the leadership of the Vanuatu Department of Environmental Protection and Conservation (DEPC) Director, Donna Kalfatak, in the oversight of the report. The diligent work and coordination by Trinison Tari facilitated the input and contributions from local stakeholders – this was critical to the preparation and the drafting of the report. Information and data support assessments were carried out by Nigel Batie, Rolenas Baereleo, Dean Launder Wotlolan, Ionie Bolenga, Naomay Napuram and other staff at DEPC. The SOE Report builds on an earlier draft prepared by Vatu Molisa and Nigel Batie, for which we are most grateful. Peter McDonald and Vani Koroisamanunu coordinated the regional input with oversights and contributions from Jonathan Porter, Lagi Reupena, Paul Anderson, Tavita Sua and Jope Davetanivalu of the Secretariat of the Pacific Regional Environment Programme (SPREP). Acknowledged the support and contribution of the Capacity building related to Multilateral Environmental Agreements (MEAs) in African, Caribbean, and the Pacific (ACP) Countries Phase III Programme (ACP MEAs 3). The contributions from the national stakeholders that attended the national consultation and validation workshops, provided data and other information on the themes and indicators of the SOE is gratefully acknowledged. Their contributions have made this report an important national document. International partners and experts on various areas of biodiversity have also provided data and information, and we thank them for their input. Posa Skelton of Oceania Research and Development Associates coordinated the drafting of the SOE. A list of the participants and contributors is provided in Appendix 1.

Acronyms

ACIAR	Australian Centre for International Agricultural Research	EEZ	Exclusive Economic Zone
ADB	Asian Development Bank	EIA	Environmental Impact Assessment
AFD	Agence Francaise pour le Developpement	ENSO	El Niño Southern Oscillation
AQIS	Australian Quarantine and Inspection Service	FAD	Fish Aggregating Device
AUSAID	Australian Aid	GDP	Gross Domestic Product
BNZ	Biosecurity New Zealand	GEF	Global Environmental Facility
BV	Biosecurity Vanuatu	GHG	Green House Gas
CBD	Convention on Biological Diversity	GWH	GigaWatt Hours
CCA	Community Conservation Area	HCFC	Hydro-Chloro-Fluoro-Carbon
CCDRR	Climate Change and Disaster Risk Reduction	HFC	Hydro-Fluoro-Carbon
CEPF	Critical Ecosystem Partnership Fund	HIES	Household Income and Expenditure Survey
CFC	Chloro-Fluoro-Carbon	IKEK	Indigenous Knowledge and Expression of Culture
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	INDC	Intended National Determined Contributions
COM	Committee of Ministers	IPPC	International Plant Protection Convention
CSIRO	Commonwealth Scientific and Industrial Research Organisation	IRENA	International Renewable Energy Agency
CSO	Civil Society Organisation	JMP	Joint Monitoring Programme
CVI	Commonwealth Vulnerability Index	LDC	Least Developed Country
DARD	Department of Agriculture and Rural Development	MAC	Mobile Air Conditioning
DEPC	Department of Environmental Protection and Conservation	MACBIO	Marine and Coastal Biodiversity Management in the Pacific Island Countries
DESP	Department of Economic and Social Planning	MCCAMGEEDM	Ministry of Climate Change Adaptation, Meteorology and Geo-Hazards, Environment, Energy and Disaster Management
DFAT	Department of Foreign Affairs and Trade (Australia)	MEA	Multilateral Environmental Agreement
DOE	Department of Energy	MESCAL	Mangrove Ecosystems of Climate Change Adaptation and Livelihoods
DOF	Department of Fisheries	MoH	Ministry of Health
DoWR	Department of Water Resources	NAB	National Advisory Board

NAPA	National Adaptation Programme of Action	SUMA	Special and Unique Marine Area
NDC	National Determined Contributions	TEM	Traditional Environment Management
NDMO	National Disaster Management Office	UNELCO	Union Electrique du Vanuatu Ltd
NERM	National Energy Road Map	UNEP	United Nations Environment Program
NGO	Non-Governmental Organisation	URA	Utilities Regulatory Authority
NISTAC	National Invasive Species Technical Advisory Committee	UV	Ultraviolet
NOU	National Ozone Unit	VAC	Vanuatu Agriculture College
NSDP	National Sustainable Development Plan	VANGO	Vanuatu Non-Governmental Organisations
ODS	Ozone Depleting Substances	VARTC	Vanuatu Agricultural Research and Technical Centre
PCB	Polychlorinated Biphenyls	VCH	Vanuatu Central Hospital
PICs	Pacific Island Countries	VEU	Vanuatu Environment Unit
POP	Persistent Organic Pollutant	VFD	Vanuatu Fisheries Department
PPA	Physical Planning Areas	VMGD	Vanuatu Meteorology and Geo-Hazards Department
PV	Photovoltaic	VNSO	Vanuatu National Statistics Office
RAC	Room Air Conditioning	VUI	Vanuatu Utilities Infrastructure
SPC	Secretariat for the Pacific Community	WASH	Water, Sanitation and Hygiene
SPREP	Secretariat of the Pacific Regional Environment Programme		

PART ONE:

INTRODUCTION



PART ONE: INTRODUCTION



Figure 1: Map of Vanuatu (Source: <http://www.WorldAtlas.com>)

Vanuatu is an archipelago of around 80 islands and numerous islets located between latitude 12° and 23° South and longitude 166° and 173° East. Vanuatu is located around 2,000 km east of Australia, with the Solomon Islands (170 km north), New Caledonia (230 km South-West) and Fiji (800 km East) as its closest neighbours.

Melanesian people first inhabited Vanuatu around 3,300 years ago, with subsequent migration by Polynesians at a

later period. The first Europeans to visit the islands were a Spanish expedition led by Portuguese navigator Pedro Fernandez de Quirós, who arrived on the largest island, Espiritu Santo, in 1606. Queirós claimed the Archipelago for Spain, as part of the colonial Spanish East Indies, and named it La Australia del Espiritu Santo. In the 1880s, France and the United Kingdom claimed parts of the Archipelago, and in 1906, they agreed on a framework for jointly managing the Archipelago as the New Hebrides through an Anglo-French

condominium. An independence movement arose in the 1970s, and the Republic of Vanuatu was founded in 1980. Since independence, the country has become a member of the United Nations, Commonwealth of Nations, Organisation Internationale de la Francophonie and the Pacific Islands Forum.



Image source: Ben Smethers

The inhabitants of Vanuatu are called ni-Vanuatu in English. The ni-Vanuatu are primarily (98.5%) of Melanesian descent, with the remainder made up of a mix of Europeans, Asians and other Pacific islanders. Three islands were historically colonised by Polynesians. About 20,000 ni-Vanuatu live and work in New Zealand and Australia. In 2006, the New Economics Foundation and Friends of the Earth environmentalist group published the Happy Planet Index, which analysed data on levels of reported happiness, life expectancy and Ecological Footprint, and they estimated Vanuatu to be the most ecologically efficient country in the world in achieving high wellbeing.

The total area of Vanuatu is approximately 860,000 km² taking into account the Exclusive Economic Zone 200 miles from the shore. The total land area is only 12,336 km², which represents 1.4% of the total country area. Only 12 islands can be considered as significant in terms of economy and population. The eight largest islands contribute 87% of the total land area (Weightman 1989). The capital city, Port Vila, is located on the island of Efate.



Image source: Ben Smethers

Vanuatu is an island arc resulting from the geological activity of the New Hebrides subduction zone and is part of the Pacific Ring of Fire. Vanuatu is geologically young; the islands are mostly mountainous and volcanic with some raised reef islands and a few low coral islands and reefs. The highest peak, Mount Tabwemasana on Espiritu Santo, rises to 1,879 m above sea level. Corollaries of the subduction are the numerous volcanoes that constitute the majority of the islands, as well as contributing to the very active seismicity Vanuatu experiences.

The climate in Vanuatu varies from wet tropical in the northern islands to dryer subtropical in the south of the Archipelago. Average temperatures range between 21°C and 27°C and average humidity ranges between 75% and 80%. Average annual rainfall declines from over 4000 mm in the north, to less than 1500 mm in the south. The country is prone to cyclones during the warmer months from November to April.

Vanuatu has a Westminster-style constitution. The constitution created a republican political system headed by a President who has primarily ceremonial powers and is elected by a two-thirds majority in an electoral college consisting of members of the Parliament and the Presidents of Regional Councils. The President serves a 5-year term. The President may be removed by the Electoral College for gross misconduct or incapacity. The Prime Minister, who is the Head of Government, is elected by a majority vote of three-fourths quorum of the Parliament. The Prime Minister in turn appoints the Council of Ministers, whose number may not exceed one-fourth of the number of parliamentary representatives. The Prime Minister and the Council of Ministers constitute the executive government. Vanuatu currently has 12 government ministries and a Prime Minister, as well as a further 38 government agencies under ministerial control. The Constitution states that there can be a maximum of one ministry for every four Members of the Parliament. This represents a maximum of 13 ministries. Since 1994, the country has been divided into six provinces (Figure 2). Each province hosts a provincial government that delivers services to the inhabitants.

- TORBA (Torres and Banks)
- SANMA (Santo and Malo)
- PENAMA (Pentecost, Ambae and Maewo)
- MALAMPA (Malekula, Ambrym and Paama)
- SHEFA (Shepherds and Efate)
- TAFEA (Tanna, Aniwa, Futuna, Erromango and Aneityum)

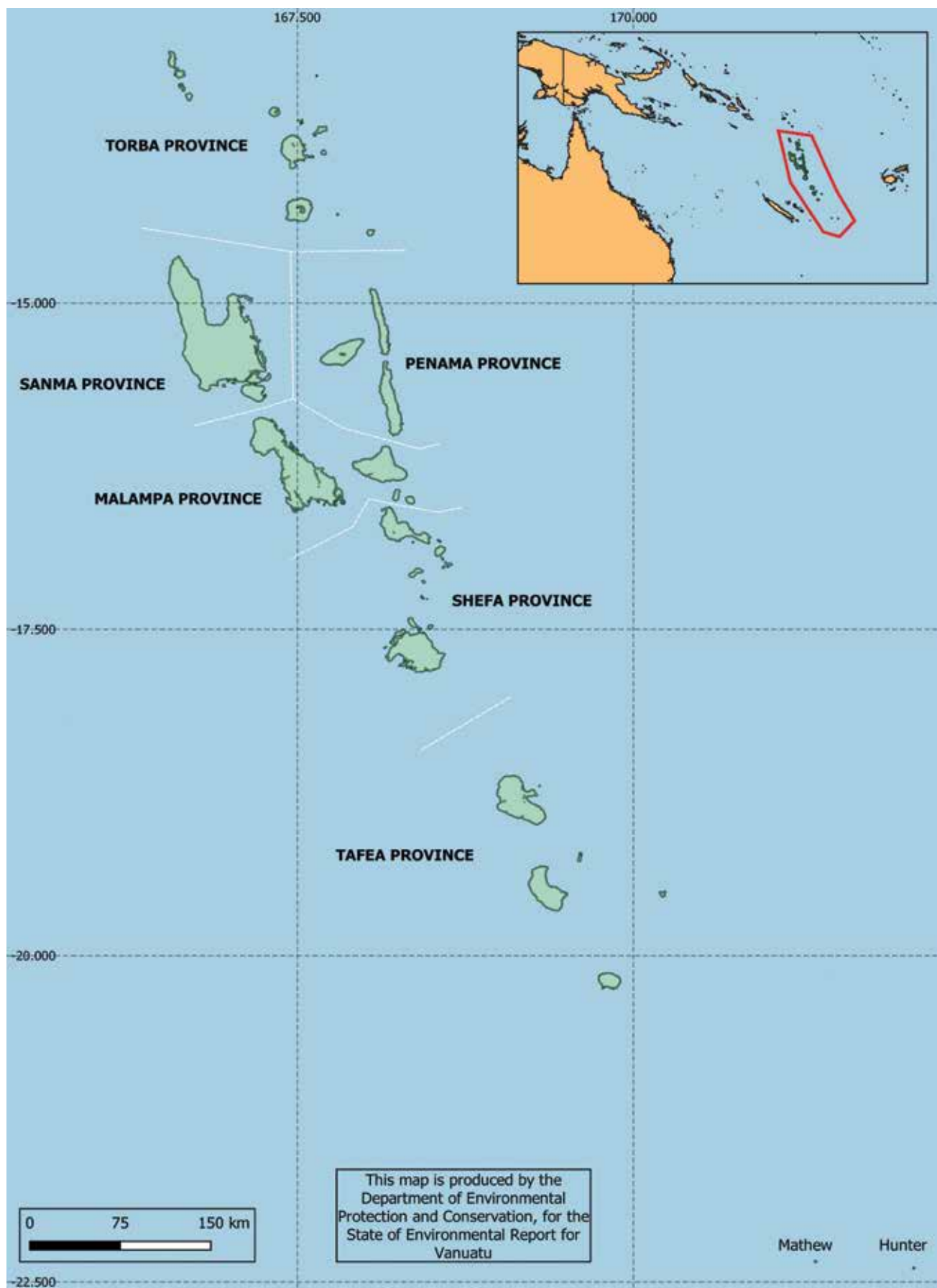


Figure 2: Vanuatu's six provinces. (DEPC 2022)

Background

The Vanuatu SOE 2022 Report is part of a region-wide effort to map the state of environment for the Pacific islands. This effort is coordinated by the Secretariat of the Pacific Regional Environment Programme (SPREP). Two national consultation workshops were held in Port Vila, to discuss the SOE themes, indicators and access to data. A validation workshop concluded the SOE 2022 Reporting design, where key stakeholders endorsed the report for approval by the Government ministers.



Participants of the SOE Validation Workshop held in Port Vila (Source: SPREP)

1.0 Purpose of the SOE Report

The aim of the SOE is to present a basis for effective environmental management planning. The report looks at the major drivers of change in the environment, which emerge from global, regional and national factors. The SOE evaluates the main pressures and the ways they affect the environment, national economies, and the lifestyles and wellbeing of citizens. The focus is to analyse the state and trends of key environmental indicators in seven thematic areas.

SOE reporting is an internationally accepted method of assessing the condition of the ecosystems and associated natural resources of a given area or jurisdiction. SOE reports bring together both quantitative and qualitative data from various local, regional, national and international sources. The data are compiled and analysed to provide a holistic

picture of the current state of the environment, and trends and patterns in relation to the natural world and human activity. The most important aspects of the environment are given priority along with emerging issues. SOEs typically include accounts of the flora and fauna species, habitats such as native forests, marine and soils, and vegetation cover. The reports also address key aspects of highly modified agricultural and built environments. Many SOEs predict emerging issues and future scenarios. This is particularly important with the need to devise strategies to adapt to the impacts of climate change. Increasingly, SOE reports can provide well-researched information for planning in areas such as natural resource management, urban planning, and tourism and resource development.

1.1 Target Audience for the SOE Report

The Vanuatu SOE 2022 Report comes at a pivotal time after a long COVID-19 global pandemic where lockdowns were the norm for many countries, including Vanuatu. The pandemic provided an opportunity to reset. Although there was hardship endured by many, the opportunity to reconnect

with nature through harvesting and consuming local products became a milestone due to slowing of international imports and exports of goods.

The Vanuatu SOE 2022 is for all ni-Vanuatu and residents in

the country, as well as all those that have a strong affinity to the islands and value the health of the environment. It is a report for all politicians, provincial leaders and community leaders to reconcile their contributions and the results from the investments over the last few years. It is a recognition of all community groups, non-governmental organisations, civil society, church groups and the business community on the effort to raise awareness and to undertake activities such as coastal clean-ups, planting trees and nurturing the environment. The report is for the young generations of Vanuatu that are learning of the climate change challenge

that will affect their homes, their food security and their livelihoods. The report is also for Vanuatu's development partners and the global community, to highlight the efforts of Vanuatu in addressing some of the global challenges, but also the need for assistance in building its capacity and providing resources to undertake the work that is much needed. While the country's constitution calls on all Vanuatu to protect and safeguard the national wealth, resources and environment, this call should be echoed around the world; for what is occurring in places like Europe, Asia and America has implications for Vanuatu communities.

1.2 Approach to the SOE Report

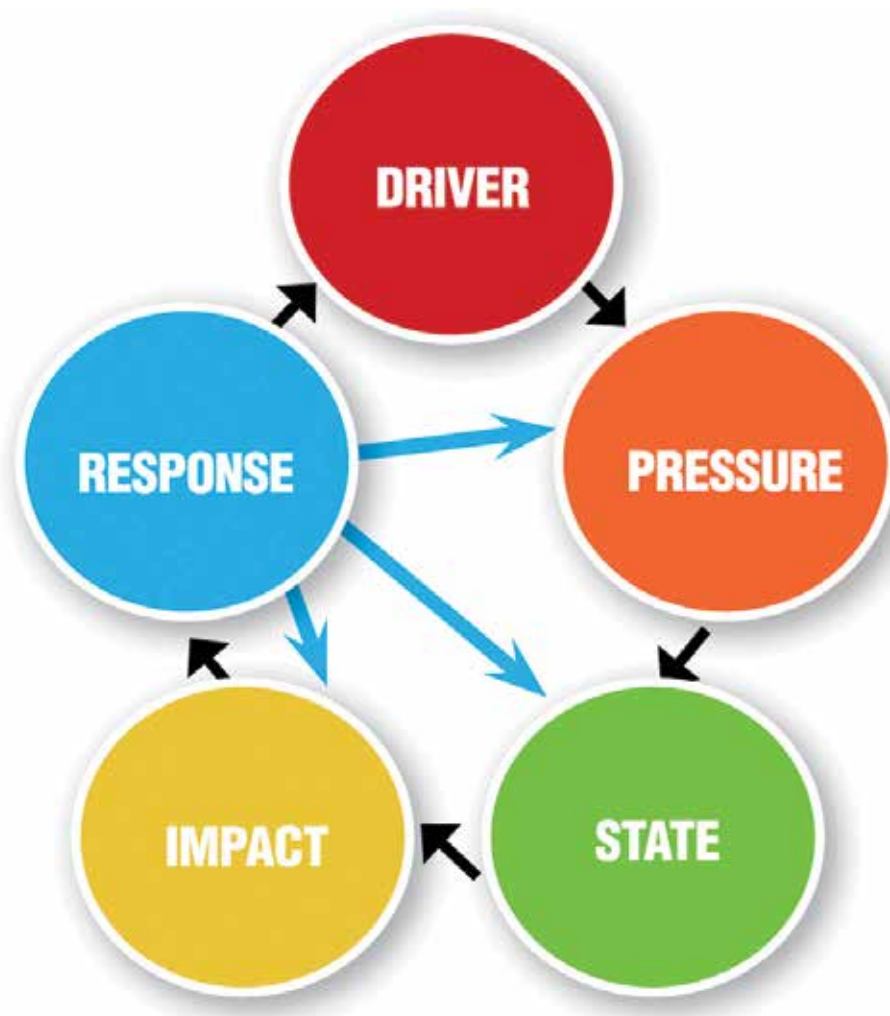


Figure 3: Driver, Pressure, State, Impact and Response (DPSIR) model used for assessing the state of the environment

The DPSIR (Driver, Pressure, Stress, Impact and Response) model is used for Vanuatu's SOE 2022 Report. It is a causal framework that demonstrate the interactions between people's actions and the effect on the environment. The environment is assessed using a number of indicators such as species population, land changes or water quality, to determine if interventions have succeeded or if new

ones need to be developed. This provides the feedback to managers, policy-makers, and to all stakeholders on what policies need to be adopted, changed or amended. The DPSIR model is used globally, and has been used throughout the Pacific island countries in the development of their state of environment reports. The framework is outlined in Figure 3, starting with the key drivers that are exerting pressure

on the environment. In many instances, key Drivers are population growth, economic developments, climate change and globalisation. These are further explained in Part 2 of the SOE. The Pressure from the drivers can directly affect the environment, such as planting more food in cleared forest areas to satisfy the demand from increasing population. The pressure for more food for the population can result in the loss of forests due to expanding agriculture production. This change in the State of land can have direct Impacts, such as loss of species habitats from lack of forests, or increased costs for farmers due to fertilisers and herbicide use. The

response of farmers or policy makers is critical in either fixing the system, or exacerbating the situation. Through this framework, one can identify areas where interventions need to be applied to sustain the environment and provide for its citizens. While this is a simplified representation of the system, the on-the-ground reality can be quite complex, as there are many factors that interact and shape the drivers, the pressure, the state, impact and response to an issue. These need to be addressed by the government and the communities.

1.3 Comparison of the 2022 SOE with previous Environmental Reports

A number of reports have attempted to provide a health check on Vanuatu's environment. A Regional Seas Programme report presented to the Conference on the Human Environment in the South Pacific held in Rarotonga in March 1982 (GOV 1980), provided a status report of the environment. The report assessed water, forests, conservation, crops and livestock, land use and tenure, mangroves, coastal zone, reefs and lagoons, fisheries, ocean, energy, waste and population. The report noted many gaps in knowledge, but highlighted concerns on increasing population, over-exploitation, lack of environmental control, pollution, and the threats posed by climate. It advocated for enacting appropriate legislation, environmental planning and monitoring.

The United Nations Environment Program (UNEP) carried out another state of the environment report but with a strong focus on the marine environment in 1990. Although the report covers the Pacific island countries, it also included some information on Vanuatu's environment (Brodie et al. 1990). The report focuses on the quality of coastal waters, the disposal of wastewater into the marine environment, coastal developments, shipping, and exploitation of marine resources. The report noted the ramping up of the efforts for the protection of the environment, which was not as high a priority in many Pacific island countries. Public concerns and pressure have forced governments to reconsider many developments and projects to ensure that the environment is not affected. The state of the marine environment continues to decline but public pressure is leading to reforms in many Pacific island countries.

A Country Report for the United Nations Conference on Environment and Development (UNCED) was produced in 1992 providing a broad assessment on sustainable development and country's aspirations and constraints with regards to use of resources. The report was the catalyst for the development of the national conservation strategy (Anon 1992).

In 1993, the Vanuatu National Conservation Strategy was developed compiling information on Vanuatu's environment. Conservation Goals and Actions were identified that included environmental legislation, institutional strengthening, tabu places, monitoring and maintaining the national conservation strategy. The Strategy was the first major national document that prioritised the environment.



Image source: Australia Gov. Department of Foreign Affairs

Vanuatu's previous SOE report (or similar) was prepared in 2005 by the late Ernest Bani for SPREP with financial assistance from the United Nations Development Programme (UNDP) and the Australian International Development Assistance Bureau (AIDAB).

- Part 1 of the report focused on Vanuatu's natural environment – geology and geomorphology, climate, land and coastal environment, and marine environment.
- Part 2 focused on the human environment – population and education.

- Part 3 focused on the economic and built environment – economic framework, infrastructure and industrial development, and pollution.
- Part 4 focused on environmental management – government administration, land tenure, environmental law, and environmental monitoring.
- Part 5 focused on priority programmes and projects.

The report noted that effective sustainable development could not be achieved without the involvement of custom landowners. It noted the level of environmental awareness to be low. Endemic species and important areas have been identified but urgent actions for their protection need to be implemented. Logging is an important revenue for the country but its sustainability needs to be strengthened. Waste management was highlighted as one of the urgent concerns for the country. Twelve recommendations were suggested including biodiversity baseline surveys, documentation of traditional use and management, harmonised legislation and protection plans for species and areas, control of invasive species, and management of pollution and waste.

Although the 2005 SOE report provides a detailed and useful overview of the environmental issues facing Vanuatu in the 1990s-2000s (many of which are still relevant today), and provides some recommendations for addressing them, it is lacking in quantitative data and external references in support of its assessments. It does not use measurable indicators to determine trends over time and relies heavily on anecdotal evidence and personal observations. In addition, some of its information is inevitably out of date, as global understanding of topics such as climate change has moved forward significantly in the last 27 years.

In comparison, this 2022 SOE report includes a much greater focus on quantitative data and external sources of information; is structured around seven themes and 33 indicators and sub-indicators; determines 'status', 'trend', and 'data confidence' for each indicator, and uses the DPSIR framework.



Image source: Ben Smethers



Image source: Australia Gov. Department of Foreign Affairs

Another assessment report was completed in 2010 as part of the 5-year review of the Mauritius strategy on the implementation of the Barbados Programme of Action for Sustainable Development (Anon 2010). The Mauritius Strategy sets actions and strategies in 19 priority areas. The priority areas of the strategy, which are also key areas in Vanuatu's SOE 2022, include climate change, environmental disasters, waste management, marine resources, land resources, energy resources, biodiversity and culture. The Vanuatu national assessment report provides the key response in addressing these priority areas, such as the establishment of the National Advisory Committee on Climate Change (NACCC) and the development of the National Adaptation Program of Action (NAPA). The national assessment report also highlighted the challenges that the country was facing, especially on the issue of waste management and threats to resources from global warming. On the energy resources, Vanuatu noted a heavy dependence on imported petroleum and renewable energy remained low at less than 1%. Knowledge on biodiversity was stated to be poor, but noted that with coastal settlement and clearance of lowland forests, many species were likely to be affected.

In 2010, an outlook report on the state of marine biodiversity in the Pacific was released covering key pressure, state and response on issues such as nutrient loading, sea surface temperature, CO₂ flux, port activities and fish stocks (Kinch et al. 2010). It noted Vanuatu's key threats as land-based, subsistence and commercial fishing, sea surface temperature and invasive species. The number of Vanuatu's marine

species on the IUCN Red List was 96, with coral species dominant (78 species). The report concluded that there is still a data deficit in many countries on key biodiversity measures. There is also a lack of capacity (human, technical, institutional and financial), which continues to be a challenge in the 2022 SOE Report. The outlook report noted that pressure continues to worsen and strong institutional and governance capacity is required in order to address these challenges.

Vanuatu has produced a number of National Reports to the Convention on Biological Diversity. The first was completed in 1998, noting traditional tabu as part of the country's efforts to manage biodiversity. The sectoral approach to managing resources may have contributed to over-harvesting of commercially important species. The second national report noted the establishment of the Environment Unit and the National Biodiversity Advisory Committee (Bani 2002). Four working groups were formed to address the key issues:

- Technical and scientific Capacity
- Traditional Knowledge and Rights
- Institutional Capacity for Biodiversity Conservation
- Biodiversity Conservation and Sustainable Use

Additional national reports have been submitted, which are also included in the MEA indicator, on the Environmental Governance theme of the 2022 SOE Report.

1.4 Themes for the SOE Report

The themes and indicators for the SOE align with a number of regional and international obligations as highlighted below.

Table 1: Summary of Themes and Indicators for the State of Environment Report 2022

Theme	Sub-topic	Indicators	MEAs and Regional Framework
Atmosphere and Climate	Greenhouse Gas	Trend in GHG emissions	SDG – Goals 7; 11, 13; 15 SAMOA Pathway [Climate change; Sustainable Energy; Disaster Risk Reduction]. UNFCCC [Article 2, Article 4.1, Article 4.2] Kyoto Protocol CBD – Targets 8; 10; 15
	Ozone Depleting Substances	Trend in ODS emissions	SDG – Goals 7; 11, 13; 14 SAMOA Pathway [Climate change; Sustainable Energy; Disaster Risk Reduction]. UNFCCC [Article 2, Article 4.1, Article 4.2] Kyoto Protocol CBD – Targets 8; 10; 15 Montreal Protocol UNFCCC
	Physical Climate	Trends in Rainfall, Temperature, Sea Level Rise and Ocean Acidification	SDG – Goals 7, 11, 13, 14 (Climate Action); Goal 14 (Life Below Water) SAMOA Pathway – Climate Change (44a-d) Montreal Protocols, UNFCCC CBD – Targets 8, 10, 15
	Climate and Disaster	Climate-related disaster loss	CBD –Target 8, 10, 15 SDG - 7, 11, 13, 14 UNFCCC SAMOA Pathway
Land	Land changes	State of Vegetation	CBD – Target 11; Target 14 SDG – Goal 6 SAMOA Pathway (4 – Sustainable Use of Islands Natural Resources)
	Forests	Trend in forests	CBD –Target 5; Target 7; Target 15 SDG – Goal 15 (Life on Land) SAMOA Pathway (4 – Sustainable Use of Islands Natural Resources)
	Agriculture	Trend in agriculture	SDG – Goal 15: Life on Land CBD - Target 5; Target 7; Target 15 SAMOA Pathway

Theme	Sub-topic	Indicators	MEAs and Regional Framework
Marine and Coast	Coral Reef	Per cent in live coral cover	CBD – Target 6, Target 10; Target 11; Target 12 CITES Ramsar Convention SAMOA Pathway (4 – Sustainable Use of Islands Natural Resources)
	Fisheries	Trend in the subsistence fishery	CBD – Target 6 Target 10; Target 13 SDG – Goal 14 (Life Below Water) SAMOA Pathway (4 – Sustainable Use of Islands Natural Resources)
		Trend in aquaculture fishery	
		Trend in offshore fishery	
		Trend in deep water fishery	
	Coastal water quality	Trend in faecal and total coliform counts	CBD – Targets 11, 14 SDG – Goals 6, 14
Biodiversity	Marine Protected Areas	Size of coastal and EEZ being managed	CBD – Targets 5, 6, 7, 10, 11 SDG – Goals 6, 12, 14, 15 UNCLOS, MARPOL, SAMOA Pathway, Noumea Convention, NSDP, National strategy for Dev. of Statistics, NEPIP, SOP Community Based Fisheries Management.
	IUCN Red List	Trend of endemic species listed in the IUCN Red List and their status	CBD – Target 5; Target 6; Target 10; Target 12; SDG – Goal 15, CITES, Ramsar, CMS
	Wetlands	State of protection for wetlands	SDG – Goals 14, 15 CBD – Targets 5, 10, 11
	Environmental Invasive Species	Number of species under management	CBD – Target 9 SDG – Goal 15 (Life on land)
	Conservation and Protected Areas	Size of protected areas	CBD – Target 6; Target 11; Target 12; Target 13; Target 15 SDG – Goal 15 (Life on Land)

Theme	Sub-topic	Indicators	MEAs and Regional Framework
Built Environment	Renewable Energy	State and contributions to Vanuatu's energy need	SAMOA Pathway – Sustainable Energy [47, 48, 50]; Oceans and Seas [53]; Sustainable Transportation [67] SDG – Goal 7; Goal 11; Goal 12; Goal 13.
	Waste Management	Solid waste generation Recyclables Hazardous Waste	SDG – Goal 3; Goal 6; Goal 8; 11; Goal 12 CBD – Target 8 Asbestos Convention Asbestos-Free Pacific: A regional strategy and action plan 2011 Basel Convention Waigani Convention
	Sanitation	Access to and quality of sewage treatment	CBD – Target 8 Noumea Convention (Dumping Protocol, Emergencies Protocol) SDG – Goal 3; Goal 6; Goal 11; Goal 12 Goal 14
	Potable Water	Access to safe drinking water	CBD – Target 14 SDG – Goal 3; Goal 6; Goal 11; Goal 12; Goal 14; Goal 15 SAMOA Pathway
Culture and Heritage	Language	State of indigenous languages	UNESCO SDG – Goal 3 CBD – Target 18
	Traditional Knowledge	% of population able to perform traditional practices	UNESCO CBD – Nagoya Protocol SAMOA Pathway
	Traditional productions	% of population performing traditional crafts	UNESCO CBD – Nagoya Protocol SAMOA Pathway
	Food Production and Consumption	% of population engaged in production and consumption	CBD – Target 14; Target 18 SDG Goal 12 SAMOA Pathway
	Sites of National Significance	State and management of Vanuatu's national sites	CBD – Target 18 Convention on the protection of the World Cultural and Heritage (WHC 1972) NBSAP – Theme 8 SDG – Goal 11

Theme	Sub-topic	Indicators	MEAs and Regional Framework
Environmental Governance	MEAs	Trend in meeting MEAs reporting requirements	CBD – Target 2, 20
	EIAs	% of EIA developments being scrutinised on environmental issues	
	Compliance and Prosecution	Number of prosecutions under the Environment legislation	
	Environmental Funding	Trend in national budget allocations for the Environment Department	

1.5 Reader's Guide to the SOE Report

How to read the report

The SOE Report follows a similar format to that adopted by other Pacific island countries, where a large body of information is assessed and summarised to provide the latest state for a given theme and indicator. The report can be read from start to finish, or browsed using the seven themes, or the indicators. Some of the indicators are closely aligned with other themes such as Wetlands, which is included under the Theme Biodiversity, but could also be included in the Land theme. At the start of each Theme, an overview is provided as a quick summary of the state of the indicator, the key findings, response and recommendations. There are also symbols to help highlight the state of indicator, as well as the link of the indicator to national policies, regional agreements and international obligations.

For each indicator, it is assessed on:

- Its present status, outlining the current health of key habitat types and resources as well as the level of confidence based on the data available. Where possible datasets over a number of years are used to determine whether there is a positive, negative or stable trend.
- Pressures relating to the dominant factors and drivers

Indicators

Indicators are key objectives that help measure the state of Vanuatu's environment. There is a concerted effort to standardise indicators for State of Environment reports in the Pacific islands region, which will allow for streamlining

of socio -environmental change affecting biodiversity, with an emphasis on recent changes, and opportunities relating to management, knowledge generation, or socio-ecological benefits of progress towards the target outcome; and

- Response focuses on the actions of the Government and other national stakeholders in addressing and improving the state of the indicators.
- Recommendations – where there are shortcomings or areas that need to be addressed, these are highlighted in the recommendations part of the assessment.

A guide to the symbols used

The use of symbols should help you to understand the state of each indicator. By using the symbols, it should provide an easy-to-understand synopsis and establish a baseline for comparing the state of each indicator/topic area with future assessments. The symbols include a state rating, a trend rating and a confidence rating. Table 2 explains how to interpret the symbols and how they were typically derived during the assessment process.

of data collection, collation and reporting. This will assist to provide updates to the various MEAs and other regional frameworks.

How to read the indicators

A definition for each indicator is provided. A summary is provided (through the use of symbols) to indicate the state, trend and the level of confidence based on the data/information being used (see below). The linkage between the indicator and other key international and national multilateral environment instruments is highlighted. The key findings, impacts, responses and recommendations are other key issues discussed in each indicator.

Status

The status is rated from good to poor for a given indicator. The rating considers a number of factors, such as the present condition of biodiversity, habitats or ecosystems; or it could consider the level of threat or effectiveness of actions to safeguard the environment. In some cases, the rating can be considered as the rate in progress toward the stated outcome: poor ($\leq 33\%$ of required progress made), fair (34–65%), or good ($\geq 66\%$ of the way to the outcome).

Trend

For each indicator, trends were examined in order to assess whether the situation is getting better or worse or staying about the same. The determination of a trend depends on the data used to define the baseline. Where the data are insufficient, the trend is then adopted based on the advice of the local experts and at the national stakeholders forum. For some indicators, there was insufficient information to judge the trend or even to determine the current state: in this case, the trend or state is reported as ‘unknown’.

Data confidence

The amount and quality of data available for assessing any trends were examined. Data were obtained through public data portals, publications, or following direct requests. The quality, quantity, and reliability of data varied due to a number of factors—for example, lack of research, comparability of methodologies, or metadata limitations.



Vanuatu has stunning rivers that flow year-round. One of the rivers on Efate Island. (DEPC)

A Guide to Understanding the Symbols

Table 2: Guide to understanding the SOE process and symbols.

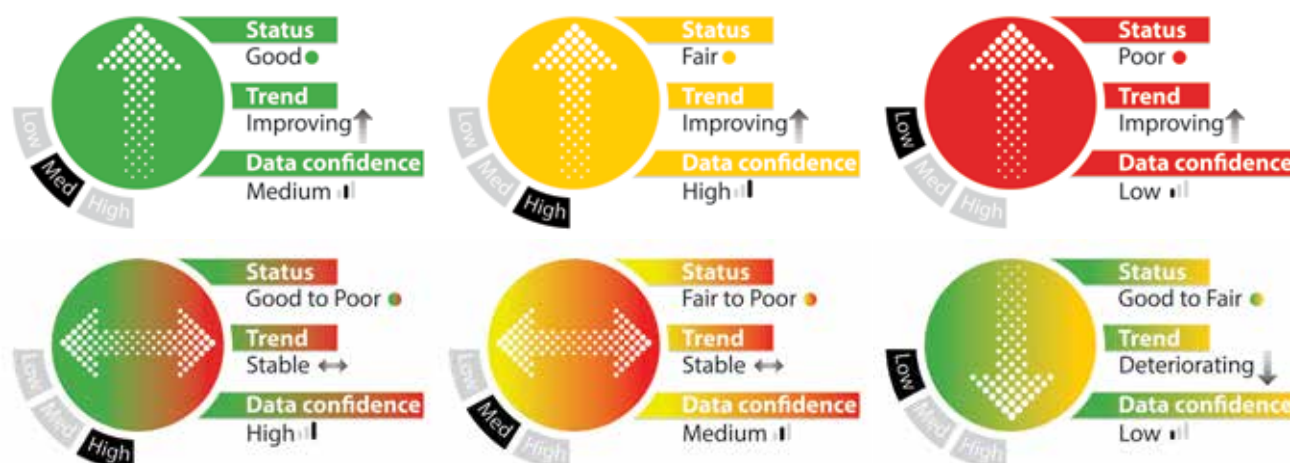
CATEGORY		DESCRIPTION	HOW IT'S DERIVED	EXAMPLE
State can be a range	Good	The level to which the indicator meets or exceeds (good), is close to meeting (fair) or is well below (poor) a given standard for healthy ecosystems, habitats, species, watersheds or an urban environment.	Assessment is based on: - Recent trends; - Comparison with similar jurisdictions; and - Comparison with “healthy” habitats and systems. Where few data exists to make an assessment based on these criteria, expert opinion is used.	
	Fair			
	Poor			
Trend	Improving 	The state of the environment related to the indicator is getting better.	Trends show a significant increase, or based on weight of evidence, indicators are improving.	
	Deteriorating 	The state of the environment related to the indicator is getting worse.	Trends show a significant deterioration, or based on weight of evidence the indicator is worsening.	
	Stable 	The state of the environment related to the indicator shows no detectable change.	Trends show no significant increase or decrease or, based on weight of evidence, the indicator is stable.	
	Mixed 	The state of the environment related to the indicator shows a mixed trend; some worse, better or stable	Used primarily for sub-topics with multiple indicators, or in cases where data show two distinct trends.	
	Undetermined 	The state of the environment related to the indicator is unclear.	Not enough data exist to determine a trend.	

CATEGORY		DESCRIPTION	HOW IT'S DERIVED	EXAMPLE
Confidence	High 	Confidence in the data and assessment process is high.	Data are of high quality and provide good spatial and temporal representation.	
	Medium 	Confidence in the data and assessment process is medium.	Data are either lower quality, geographically sparse or limited temporally.	
	Low 	Confidence in the data and assessment process is low.	Data quality is poor and does not meet any of the above criteria.	



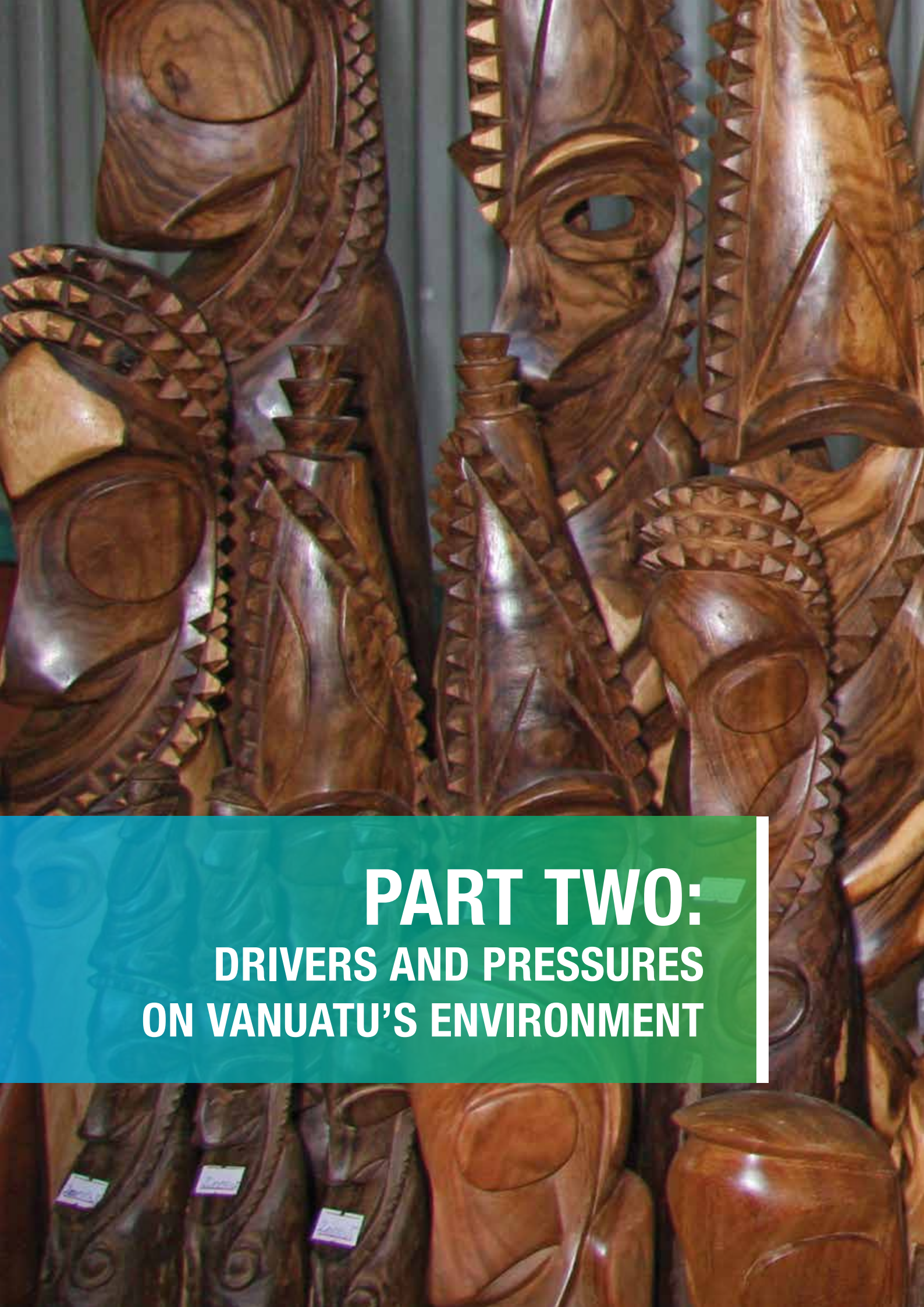
Bottom bars of **Low**, **Medium** and **High** indicate confidence in data and assessment.

COLOUR indicates state of: **Good**, **Fair**, **Poor** or can be a **Range**



ARROW indicates trend of **Improving**, **Stable**, **Deteriorating** or **Mixed**

Figure 4: Explanation of the indicator symbols



PART TWO:

DRIVERS AND PRESSURES ON VANUATU'S ENVIRONMENT

PART TWO:

DRIVERS AND PRESSURES ON VANUATU'S ENVIRONMENT

The key drivers of environmental change in Vanuatu are a rapidly growing economy (after many years of inconsistent economic performance), a young and rapid population growth, urban drift, land speculation, agricultural intensification, deforestation, inadequate fisheries and marine management, industry and trade, tourism, imported energy and transportation needs, extractive industries, and the global rise in greenhouse gas emissions (King 2007). The World Risk Report in 2012 ranked Vanuatu as highest of 173 countries in its World Risk Index, due to high exposure to natural hazards and climate change coinciding with very vulnerable societies (Alliance Development Works 2012). This scenario has implications for Vanuatu's society and environment.

2.1 Drivers

Vanuatu's environment has been subjected to changes caused by geological and climatic activities such as earthquakes, volcanic eruptions, cyclones and tsunamis. Human impacts have added to these natural events, often with catastrophic outcomes. Many of the drivers that are causing global environmental changes are common throughout the Pacific islands region, and are shared with many other small island developing states throughout the world. The priority drivers are population growth, climate change and economic development.

2.1.1 Population growth

Vanuatu's population continues to increase from an estimated 47,700 in 1950, to 75,745 in the first official census taken in 1967 (UN-DESA 2022; VNSO 2020). Another census was conducted in 1979 prior to the country's independence. Three additional censuses were held in 1989, 1999 and 2009. A mini-census was held in 2016 following Cyclone Pam, and agricultural censuses were carried out in 1983, 1993 and 2007. The most recent census data from the 2020 Census found the population to have reached 300,019 (VNSO 2020). The population projections according to UN-DESA is for Vanuatu to reach 1 million by 2100 (UN-DESA 2022).

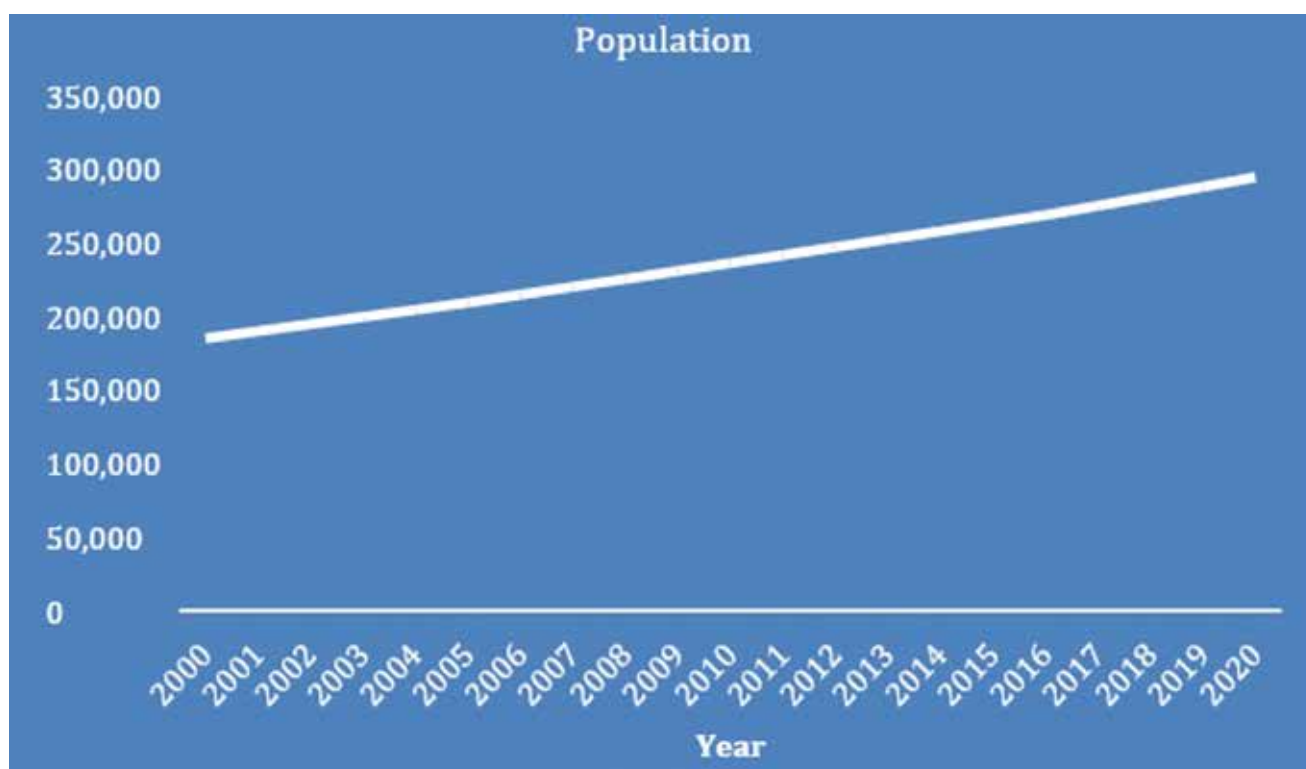


Figure 5: Vanuatu's population estimate (SPC – Pacific Data Hub – accessed July 2022)

The population growth rate remains at 2.24% (Figure 6), which is the highest in the Pacific islands region (Figure 7). Shefa province has the highest average population growth rate at 4%, followed by Tafea at 3.1%. Penama and Malampa provinces have the lowest growth rate at 1.3% (VNSO 2020). Vanuatu's demographic has 51% female and 49% male, with the majority under the age of 5 (Figure 8). The Shefa province is the most populated with Torba being the least populated (Figure 9).

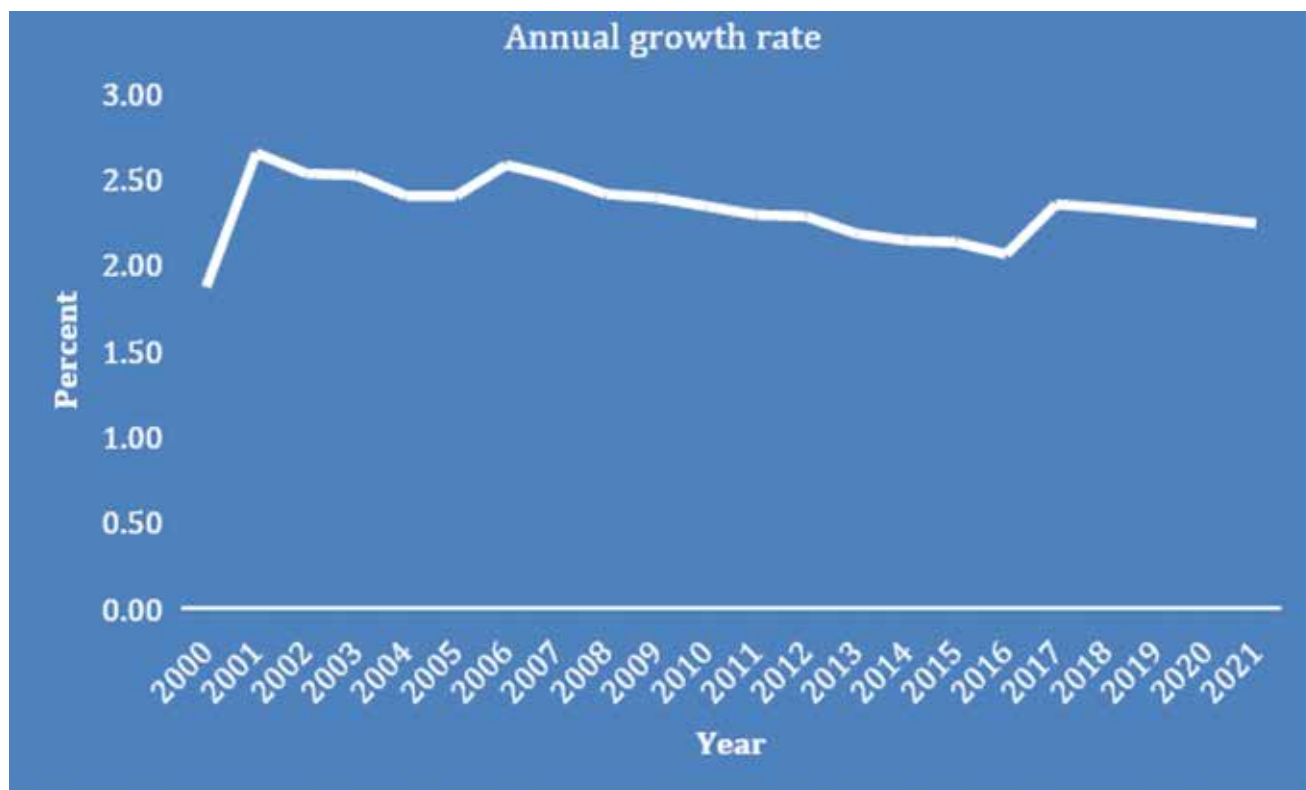


Figure 6: Annual growth rate since 2000. (SPC – Pacific Data Hub – accessed July 2022)

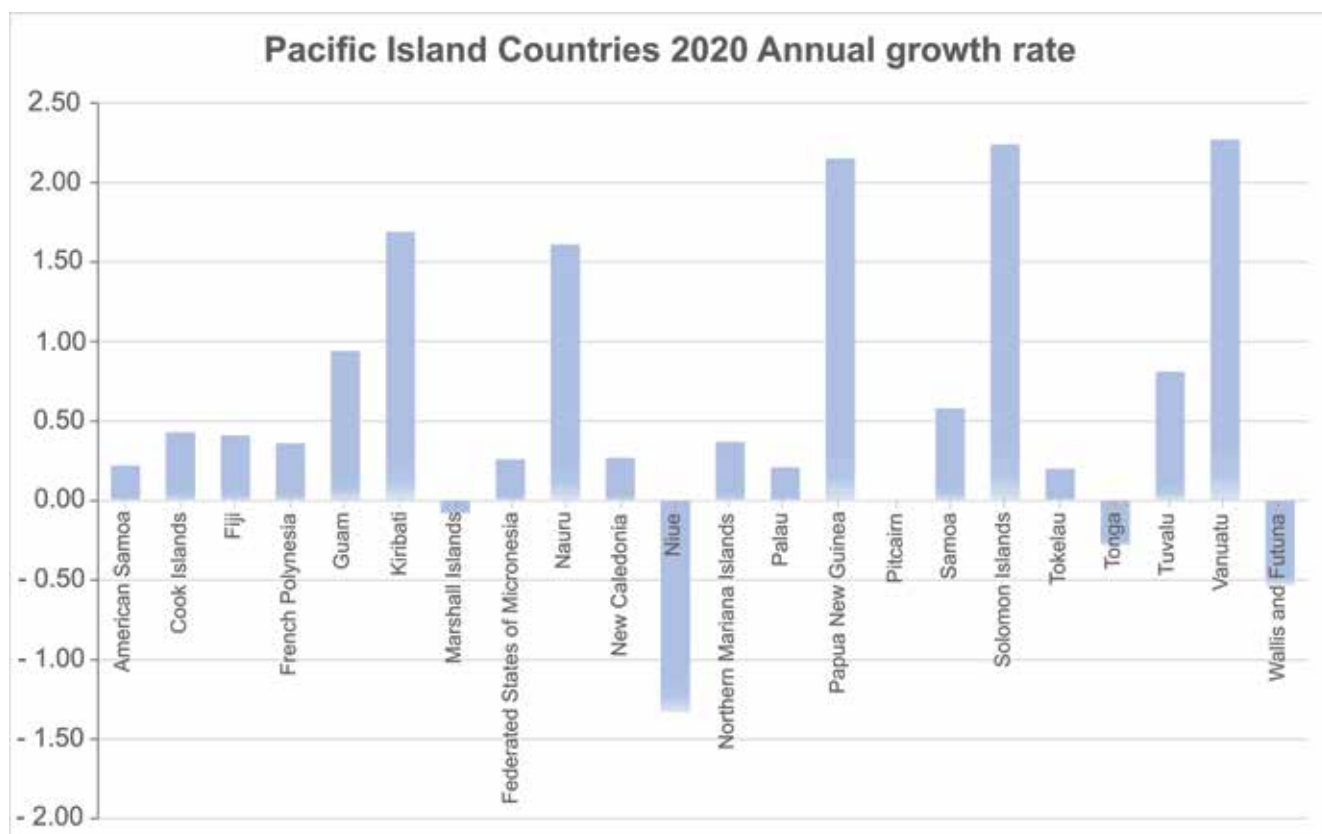


Figure 7: Pacific Island Countries annual population growth for 2020 with Vanuatu, the Solomon Islands and Papua New Guinea have growth rates above 2% - the highest in the region. (SPC – Pacific Data Hub – accessed July. 2022).

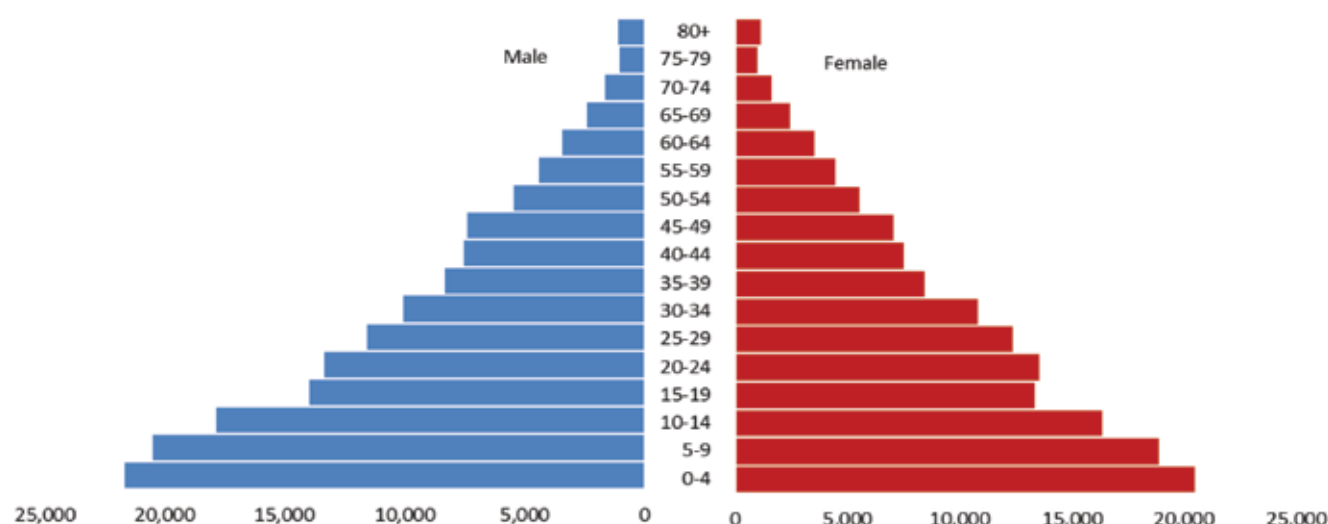


Figure 8: Vanuatu's population pyramid. (VNSO 2020)

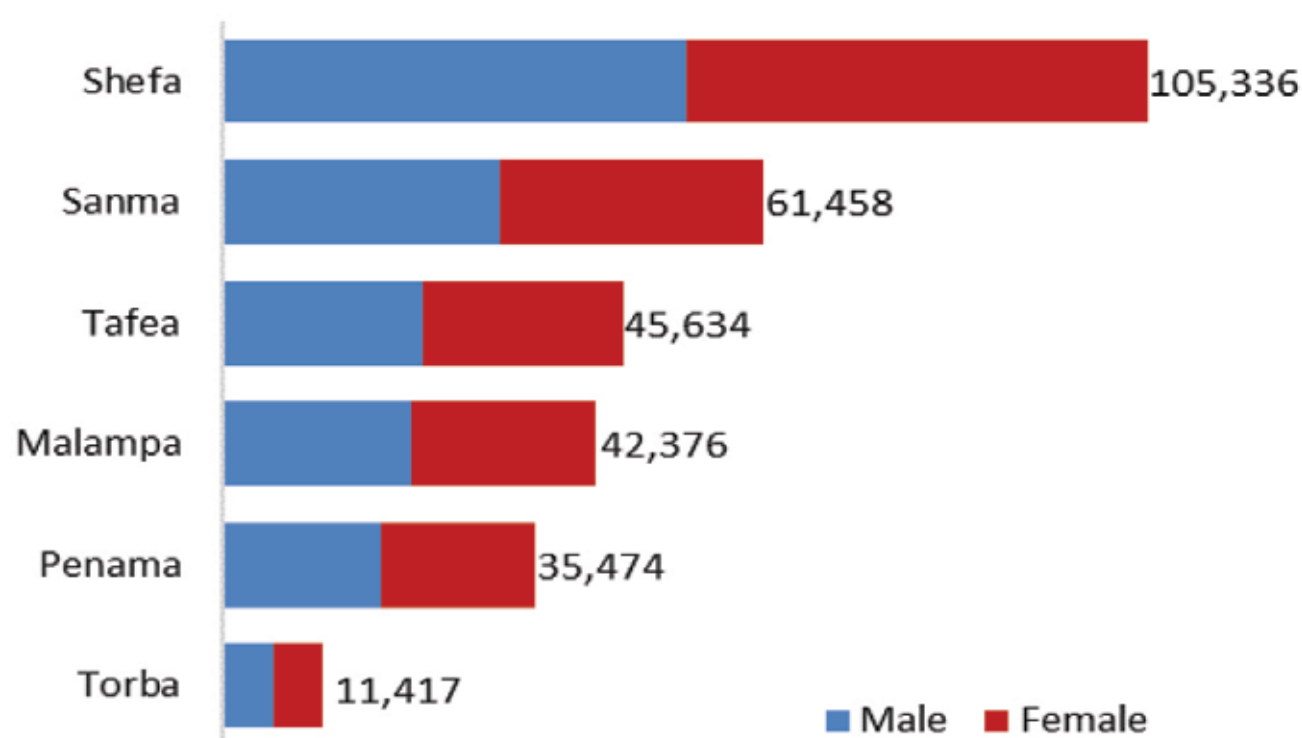


Figure 9: Population by province and sex. (VNSO 2020).

A current trend of rural out-migration is established and tends to promote the attraction of urban drift with rising unemployment among young ni-Vanuatu. Vanuatu is one of the most complex nations in the world in terms of the number of languages per head of population. About 138 languages are recorded in Vanuatu, some only by a few surviving members of ancient clans (in the South West Bay area, Malekula). A coherent cultural group can be associated with virtually each language. Dances, ceremonies, funerals, weddings, initiations, status, systems of authority, artistic styles and animal and crop husbandry all differ from island to island, and often from one district to another within the same island. For example, in Malekula, two very distinct

groups can be identified with the 'small nambas' in the south and 'big nambas' in the north. Competition and tension often arise between different cultural groups. This variety of cultures is inherited from the various waves of migrations to Vanuatu from other areas in the Pacific. Links have been established with both Papuans and Polynesians. For example, people from the village of Mele (Efate) have a language that is very close to Polynesian languages. Skin and hair colour vary greatly from one cultural group to another.

2.1.2 Economic Development

Vanuatu's economy is based on small-scale agriculture, which provides a living for about two thirds of the population. Fishing, offshore financial services and tourism are other key sectors. The total visitor arrivals to Vanuatu in the third quarter of 2017 stood at 76,836, an increase of 6% over the corresponding quarter in 2016, and 13% over the previous (second) quarter (VNSO 2017). The main suppliers of tourists and foreign aid are Australia and New Zealand. The service sector accounts for 77% of Gross Domestic Product (GDP). Other service industries include food and fish freezing, wood processing and meat canning. Agricultural products include copra, coconut oil, kava, cocoa, coffee, taro, yams, fruits, vegetables, beef and fish. Mineral deposits are negligible. In addition to the formal economic sector, there is the informal economy which involves at least 84% of the population. This rural-dwelling component of the population depends on the informal economy to support their livelihood on a daily basis

(Regenvanu 2009). Even urban-dwellers depend on it to subsidise their modern lifestyles. The informal economy is centred on production, processing and sale of agricultural and marine products, supplemented by provision of services such as carpentry and transportation, and production of baskets, mats and other handicrafts. These activities depend on the natural environment and the living and non-living resources it provides. Protection and conservation of these natural resources - Vanuatu's biological diversity - is thus essential to the nation's long-term wellbeing and sustainable development.

Vanuatu's economy contracted in 2020 by -5.0% (Figure 10) (VNSO 2020). The contraction in GDP growth was driven by drop-in services, agriculture, forestry and fishing due to the COVID-19 pandemic and Tropical Cyclone Harold (Category 5).

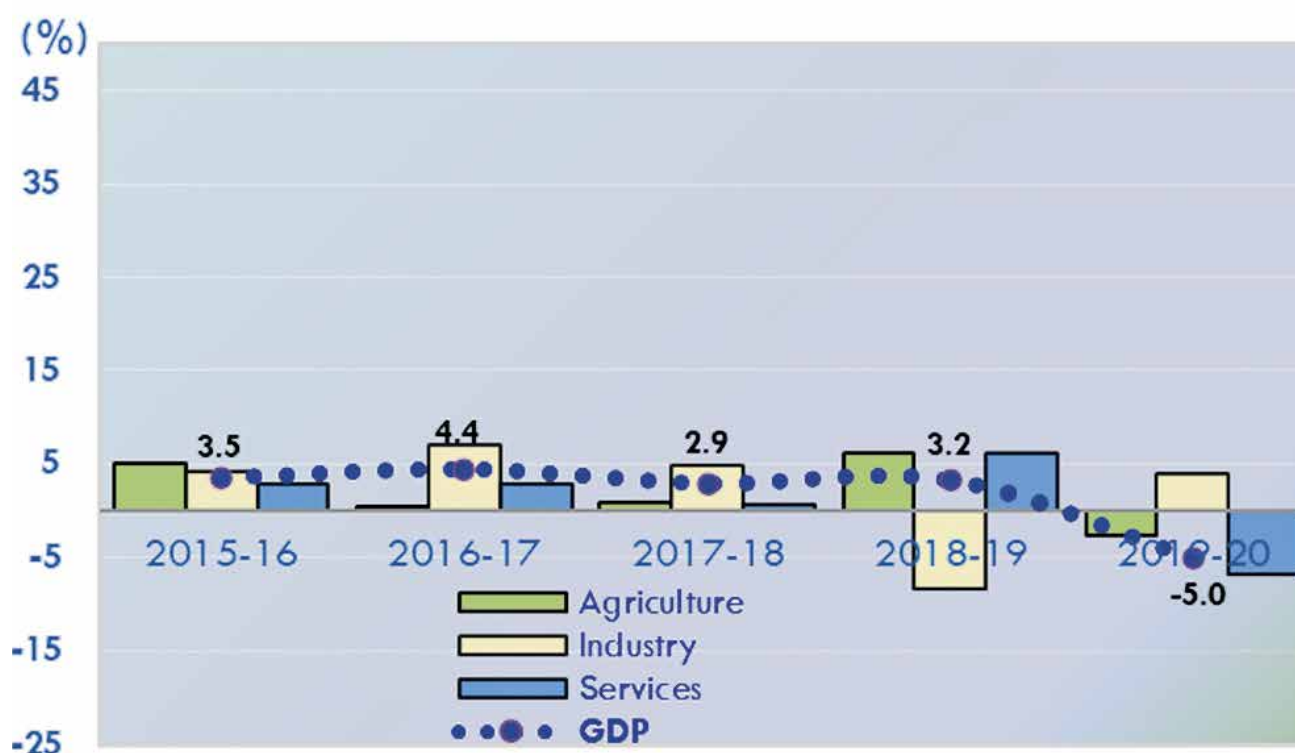


Figure 10: GDP Growth Rates by Industry - Constant 2006 Prices

One of the key challenges in pursuit of economic development is the non-compliance by some of the project developers that may cause harm to the environment.

While earning a wage can lead to positive outcomes and wellbeing in Vanuatu society, the majority of the population do not participate in the monetary economy for their basic needs. Those with access to indigenous customary lands and that use lands for food, housing, and other uses have

significantly reduced their dependence on the cash economy for basic needs and are less monetised as a result. People living in Port Vila and Luganville depend on money to purchase goods and shelter. People living in rural areas depend on money as well, although not as much as individuals in towns, to meet basic needs. The whole of Vanuatu is monetised to an extent, and employment opportunities provide a means for accessing earned income.

2.1.3 Climate Change

Climate change was once considered a pressure to the environment, but it is now a key driver of environmental change. The warming of the planet and the subsequent impacts on weather systems have had a devastating effect on

Vanuatu, with severe cyclones causing death, and changing the landscape and seascape of the country. Vanuatu has set national targets to try to limit its GHG emissions through reliance on renewables and a reduction in imported fuel consumption.

2.2 Environmental Pressures

Human activities and climate change exert pressure on the environment. When these are combined, they can have irreversible consequences to the environment.

decreasing and becoming very rare in their natural habitats or sites close to urban areas. Overharvesting, habitat degradation and habitat loss, and invasive species are the key challenges contributing to biodiversity loss.

2.2.1 Land Use

Customary lands, forests, and marine resources are complex traditional economic assets for indigenous ni-Vanuatu. Land provides sustenance for current and future generations. Land is connected to spiritual beliefs, traditional knowledge and teachings, and is fundamental to cultural reproduction. Moreover, commonly held land rights reinforce national identity. Access to indigenous land, forest and marine resources is therefore understandably a critical determining factor to one's wellbeing in Vanuatu.

Human settlement often takes place in sensitive ecological areas, such as near rivers and lakes, or along the coastal areas. Fertile areas are often used for agriculture or cattle farming. Waste from these areas can pollute riverways, drinking water sources or coastal areas. Over-use of fertilisers and other chemicals can strip nutrients from the soil, exacerbated by unprecedented rainfall or cyclones. Establishing small to medium sized industries in some of the sensitive ecological sites can have impacts to the environment. It is important that ecological impact assessments and other legal protection be provided to safeguard the environment.



Vanuatu megapode (Lars Petersen)

2.2.2 Biodiversity Loss

Vanuatu's biodiversity is relatively young due to the recent origin of many islands from volcanic activities. Species colonisation took place much later than neighbouring Papua New Guinea, Solomon Islands, New Caledonia and Fiji. Islands that are older and bigger in size provide more habitats and better soil conditions than smaller islands.

These islands support generally more species and are likely to host some endemic species. Cyclones and volcanic activities have been the main disturbances that have influenced species populations over millennia. The current situation indicates that some of the iconic species are declining in numbers, whereas there are still a lot of data gaps for many of Vanuatu's biodiversity.

Some marine species of giant clams are known to be extinct, whereas other species such as the Namalau (Megapode) are

2.2.3 Resource Extraction

Logging of forest resources has contributed to the loss of forest cover and some of the economically important species becoming rare. Forests were converted to agricultural lands, where large plantations of coconuts, cocoa and coffee were planted. Livestock also used many of the deforested sites. Marine resources were targeted primarily for subsistence use, but with increasing demand in urban centres, these resources are now harvested for sale. Offshore fishing areas attracted vessels from foreign countries, where they pay a license to fish in Vanuatu's EEZ. Targeted species were over-exploited leading to many becoming rare and some to become extinct.

2.2.4 Waste and Pollution

Pollution and the growing volumes of solid and hazardous wastes are major threats to the environment and sustainable development of Vanuatu.



Image source: DEPC

Globalisation is accelerating the transition of our urban communities towards consumer economies, with increasing urbanisation, migration, and participation in international trade. This is resulting in an escalation in the generation of solid and liquid wastes, and these increase the risk of coastal and marine pollution. The lack of controls on imported chemicals and the lack of capacity for managing pollutants threaten to undermine the quality and health of vulnerable ecosystems on which Vanuatu depends.

2.2.5 Water Use

Ground and surface water is used for domestic purposes throughout the country. In urban areas the main water source is shallow aquifers, whereas in rural areas various sources are used such as bores, wells, springs, rivers and rainwater catchments. Urban water supplies are provided by UNELCO (a private company) in Port Vila and Public Works in Luganville, Isangel and Lakatoro. All rural supplies are donor-funded and designed and delivered by either the drilling section or rural water supply (within DGMWR). Rural water supplies are operated and managed by the local community. While access to a proximate source of drinking water is high (94% access to an improved drinking water source and 86% access on the premises), the safety and reliability of the water consumed by most people in Vanuatu is not known.



Image source: DEPC

2.2.6 Energy consumption

Vanuatu's energy needs have traditionally relied on imported fossil fuels. Electrification of the whole country remains a target, however, this is hampered by limited infrastructure development, capacity and financial resources. The push for renewables and the availability of solar have seen a rise in the number of households' dependent on renewables for their lighting needs (65%) (Figure 11) (VNSO 2016) compared to 2009 when nearly 50% of households used kerosene (VNSO 2009).

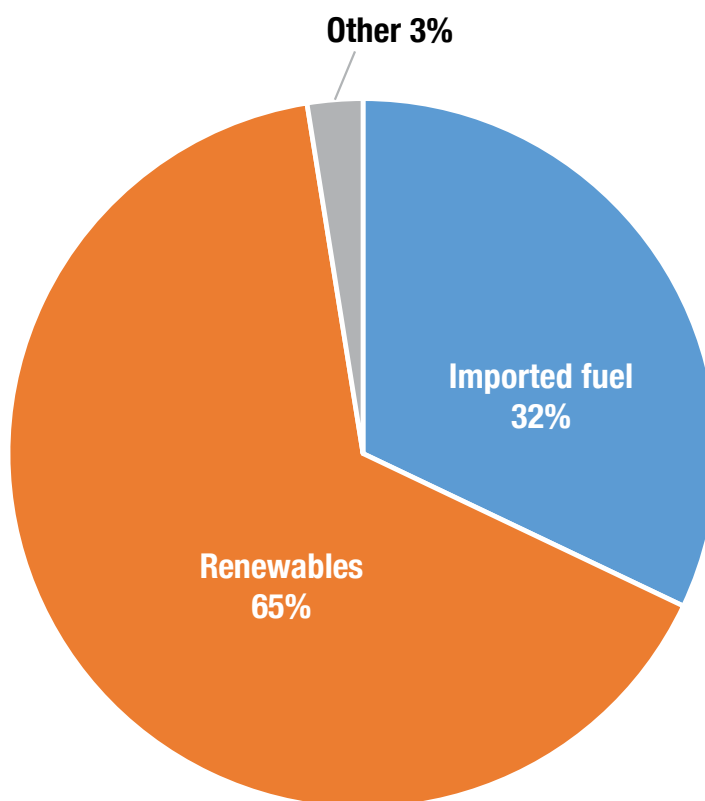


Figure 11: Households with their main source of lighting. (VNSO 2016)

For many households, firewood collected from forests or near residential homes provides the majority of the energy source used for cooking. Over 90% of households in Vanuatu use firewood as the main source (VNSO 2016). Those living in rural areas are the main firewood users.

With the increasing costs of imported fuels, Vanuatu is looking more at renewables to provide an alternative to their energy supplies. A number of renewable options ranging from solar, wind turbines, hydro-electric and thermal are being proposed.

An aerial photograph of a tropical landscape. In the center, there are several terraced fields, some of which are filled with water, creating a mosaic of green and dark blue. The fields are surrounded by dense tropical vegetation, including many palm trees. The overall scene is vibrant and lush.

PART THREE:

STATE OF VANUATU'S ENVIRONMENT

THEME 1:

ATMOSPHERE AND CLIMATE



Creek near Teouma overflowed in 2019. Image source: VMGD

Atmosphere and Climate Overview and Highlights

Vanuatu is on the frontline of climate change. The World Risk Report 2016 identified Vanuatu as having the highest natural risk exposure globally (Table 3), and Port Vila is the most exposed city in the world (World Risk Report 2016; World Bank Group 2021).

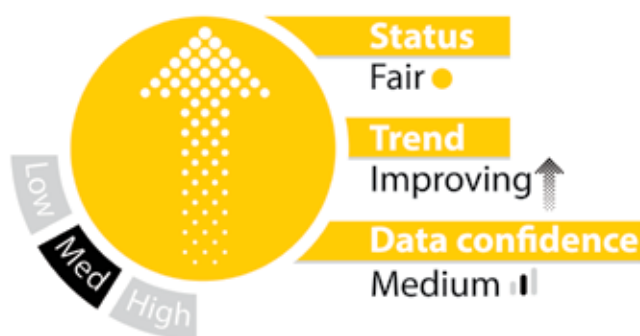
Table 3: Vanuatu tops the list of countries at the highest risk from climate change impacts. (World Risk Report 2016)

WORLD RISK INDEX		
RANK	COUNTRY	RISK (%)
1	Vanuatu	36
2	Tonga	29
3	Philippines	27
4	Guatemala	20
5	Bangladesh	19
6	Solomon Islands	19
7	Brunei Darussalam	17
8	Costa Rica	17
9	Cambodia	17
10	Papua New Guinea	16

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Trend in Greenhouse Gas emissions		GHG emission inventories completed. Vanuatu's GHG emissions remain net carbon negative despite a small increase in the 2000s. Most of the GHG emissions come from the energy and transport sectors, agriculture, livestock and waste. Land use changes and conservation of forests have been key in negating Vanuatu's GHG emissions.	Vanuatu plays an important role in the international community advocating for climate actions. It signed up to the Paris Agreement, and it has set nationally determined contributions, such as transitioning its energy sector to 100% renewable energy by 2030. A National Roadmap has been developed to assist with achieving its national targets. Recommendations Continue to build the capacity to monitor and carry out inventory of Vanuatu's GHG emissions. Raise the awareness of communities and the business sector on what they can do locally to contribute to Vanuatu's renewable energy target. Engage with development partners to secure assistance in technology development and transfer.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Physical Climate Trends		Monitoring of physical climate continues in partnership with regional partners. Projections indicate that Vanuatu's temperature will continue to rise, as well as sea level rise. Rainfall variations will continue with strong influence from other climate factors such as the ENSO and La Nina events. Acidification of the ocean will continue, as CO₂ continues unabated. The implications of ocean acidification will affect coral reefs and coastal settlement and infrastructure. Cyclones will likely be more severe but less frequent.	There are 47 meteorological stations in the country to monitor weather conditions and variations. The Physical Climate is an integral part of Vanuatu's Climate Change strategy Recommendations Build local capacity to undertake research, monitor, analyse and interpret weather information to assist with informing on actions needed to safeguard communities and natural assets. Continue to advocate globally on stronger actions and measures to curtail the rise in GHG emissions, as well as assistance for adaptation and mitigation efforts.
Climate related disaster loss		Vanuatu is the most vulnerable of any country in the world to natural disasters. The country frequently experiences droughts, floods, high temperatures and heat waves, earthquakes, tsunamis, storm surges and cyclones. Loss includes death, infrastructure damage, degradation of natural resources and ecosystems, decline in agriculture production and food security to communities.	A multipronged approach to managing the risks and mitigating disaster loss guided by the Vanuatu People's Plan (NSDP 2016-2030). Other national policies are in place such as the Nationally Determined Contributions, National Adaptation Programme for Action and the Climate Change and Disaster Risk Reduction Policy. Recommendations The policies developed relating to climate and disaster preparedness need to be implemented with urgency. Vanuatu needs support to build its current capacity and to provide sufficient resources to carry out outreach and awareness programs. Continue to encourage more research and data collecting so that knowledge is enhanced and informed actions are being implemented.

3.1.1 Greenhouse Gas (GHG) emissions



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS			 	SAMOA Pathway 43	National Sustainable Development Plan National Environmental Policy and Implementation Plan Intended Nationally Determined Contributions National Energy Roadmap National adaptation Programme of Action

Indicator definition

One of the major drivers of climate change is Greenhouse Gas (GHG) emissions from human activities. GHG emissions are now at their highest level in history. GHG insulates the Earth from the sun keeping the climate liveable. With more GHG being emitted by human activities, the layer of insulation becomes thick thereby retaining more heat. Vanuatu can assist by reducing its domestic carbon emission and inspiring other countries to do the same. Vanuatu reports its national emissions to the IPCC and communicates its Nationally Determined Contribution accordingly with the Paris Agreement. For this indicator, it assesses the volume of GHG emitted over the past few years.



Image source: Pexels – Denis Tuev

- Volume of GHG being emitted since 1994 (when the first national inventory was carried out) until the most recent data.
- Per cent of GHG emission by gas
- Volume of emission by capita
- Per cent of GHG by sector

Status and Key Finding

Vanuatu has completed its GHG emission inventories in 1994, 2000, 2005, 2010 and 2017 (Third National Communications Report 2020). The country's GHG emissions remain carbon negative, despite the increase in its emission from 299 Gg CO₂ equivalent in 1994 to 610 Gg CO₂ equivalent in 2015 (Figure 12 and Figure 13). The net carbon negative comes mainly from land use change and the forestry sector being a net sink of CO₂. The CO₂ removals from the forestry sector were estimated 1.153 Gg of CO₂ (1994) and 7,913.14 Gg of CO₂e (2000).

CO₂ represents 89% of the GHG emissions followed by CH₄ (Methane) (11%) and N₂O (Nitroxide) (0.2%) (Figure 13 and Figure 14). Other Greenhouse Gases (PFCs, HFCs, SF₆) are negligible, as Vanuatu does not have a large manufacturing sector. There are also insufficient data available for analysis (Ministry of Climate Change 2020). The CO₂ emission comes from the energy and transport sectors, whereas methane is from the agriculture, livestock (cattle, pigs, horses, goats and chicken farms), and waste (solid and water), with a small amount from the energy sector. N₂O emission is from livestock manure.

Vanuatu's per capita GHG emissions was approximately 2.302 tonnes of CO₂ equivalent per person for 2015. The global per person capita for GHG emission was about 7.234 tonnes per person in 2015. In absolute terms Vanuatu's total CO₂ equivalent emissions were around 0.0011% of the Global GHG emissions for 2015. The 2020 estimate of Vanuatu's per capita emission is 0.59 tonnes of CO₂ per person per year (OurWorldInData.org/co2 (Figure 15).

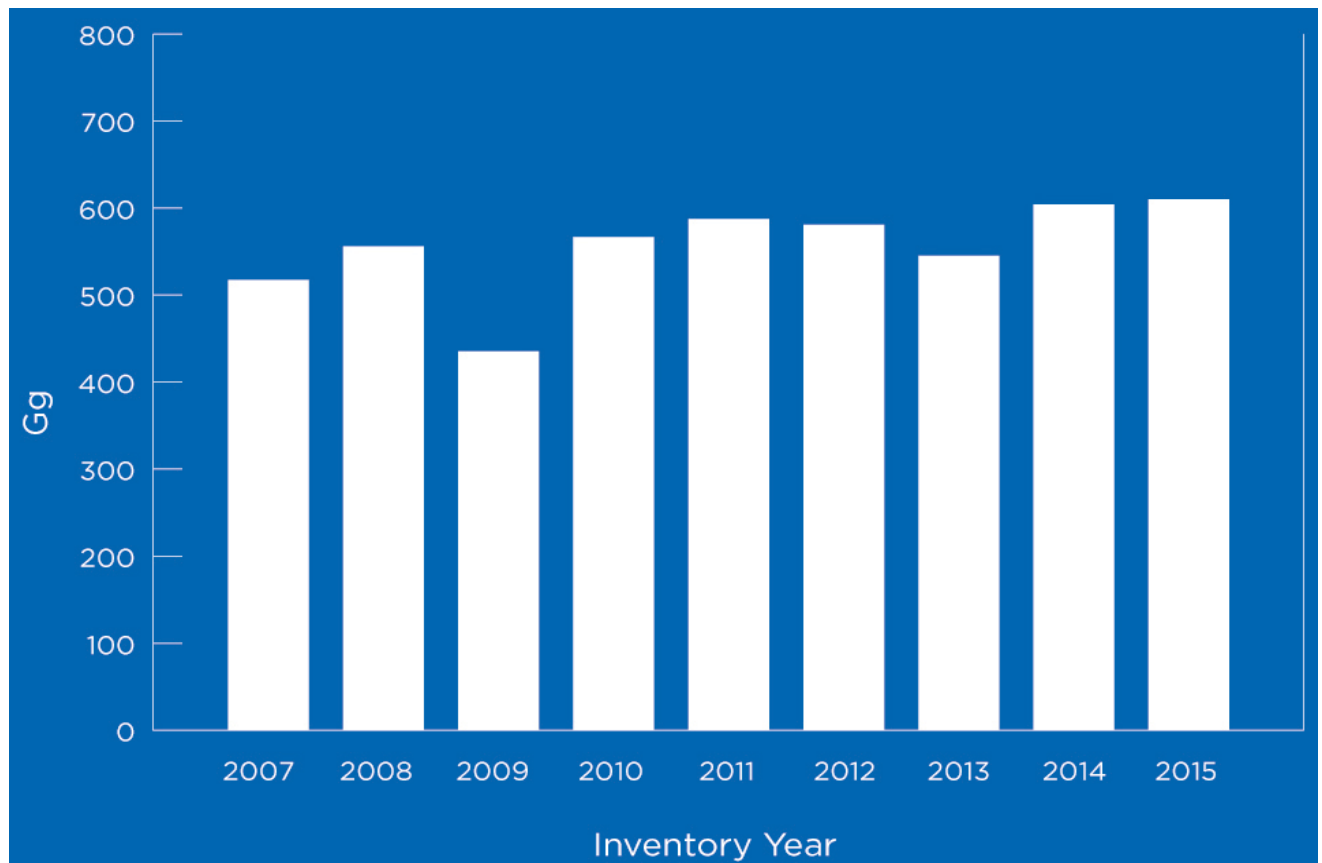


Figure 12: Vanuatu's Total GHG emission (excluding removals) Gg CO₂ equiv. 2007-2015. (Third National Communications Report to UNFCCC 2020)

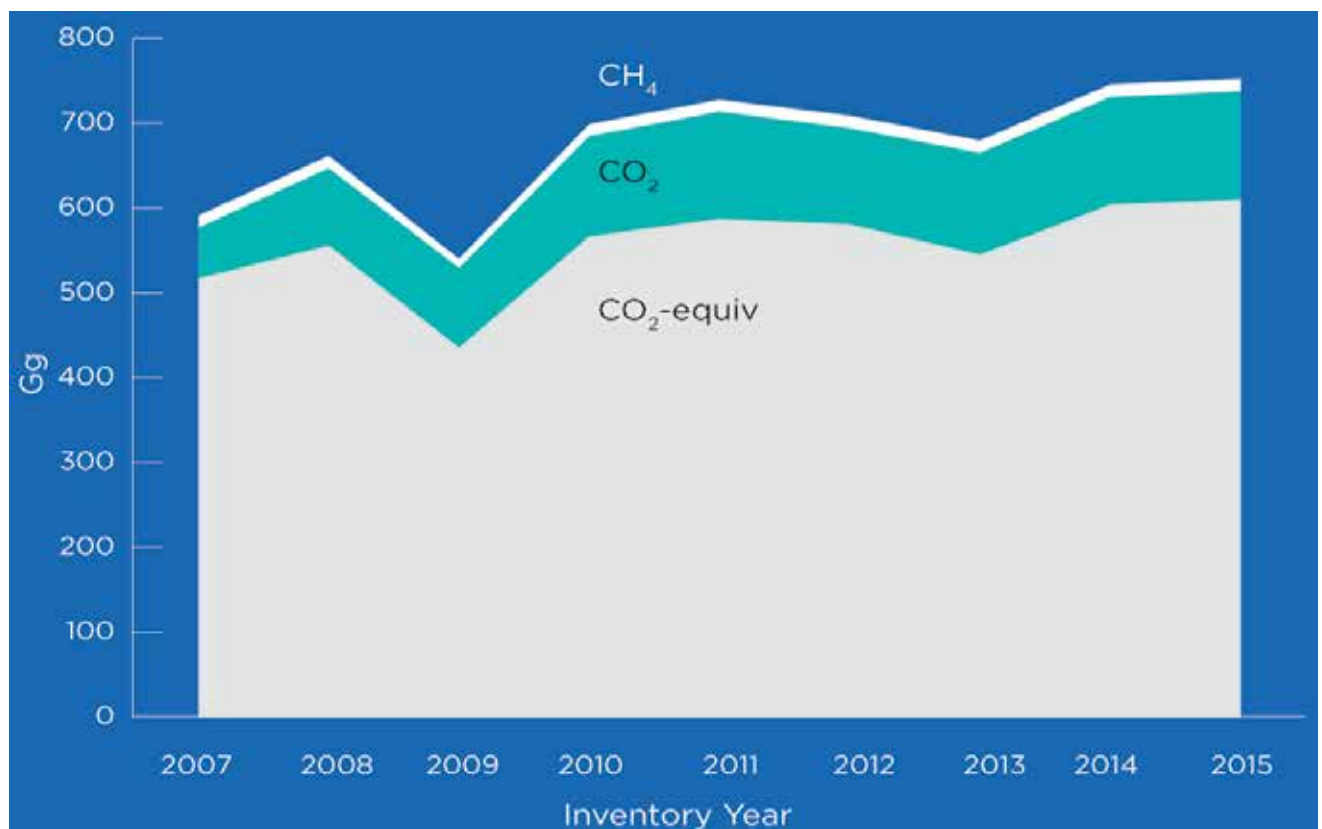


Figure 13: Vanuatu's Total GHG emissions trend by gas
(Third National Communications Report to UNFCCC 2020)

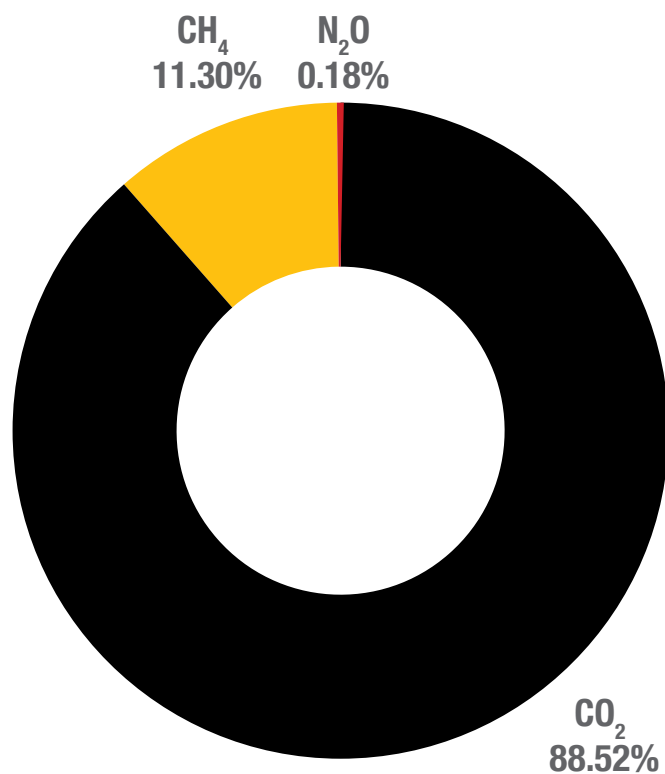


Figure 14: GHG emissions by gas types (Third National Communications Report to UNFCCC 2020)

There is a downward trend of CO₂ emissions for Vanuatu since the 1970s (Figure 15). Vanuatu recorded its highest emission in 1974 where 3060 kg CO₂ per person was emitted.

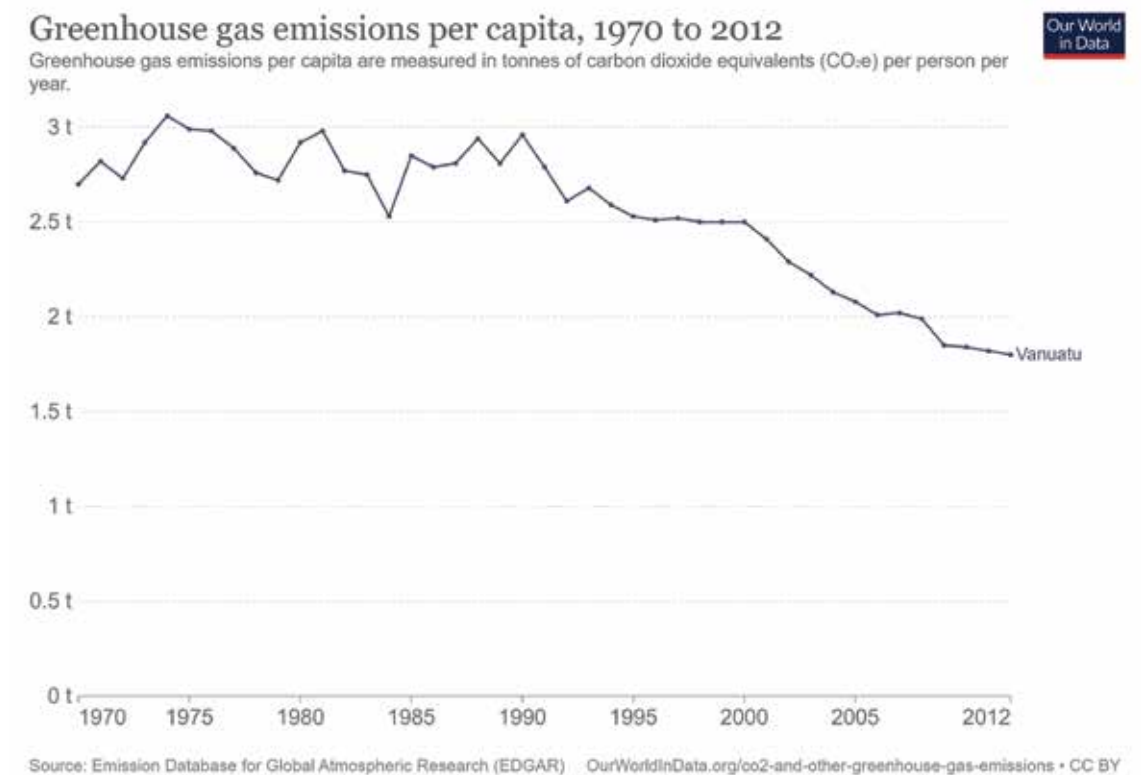


Figure 15: Vanuatu's GHG (CO₂) emissions trend since 1970s. (OurWorldInData.org)

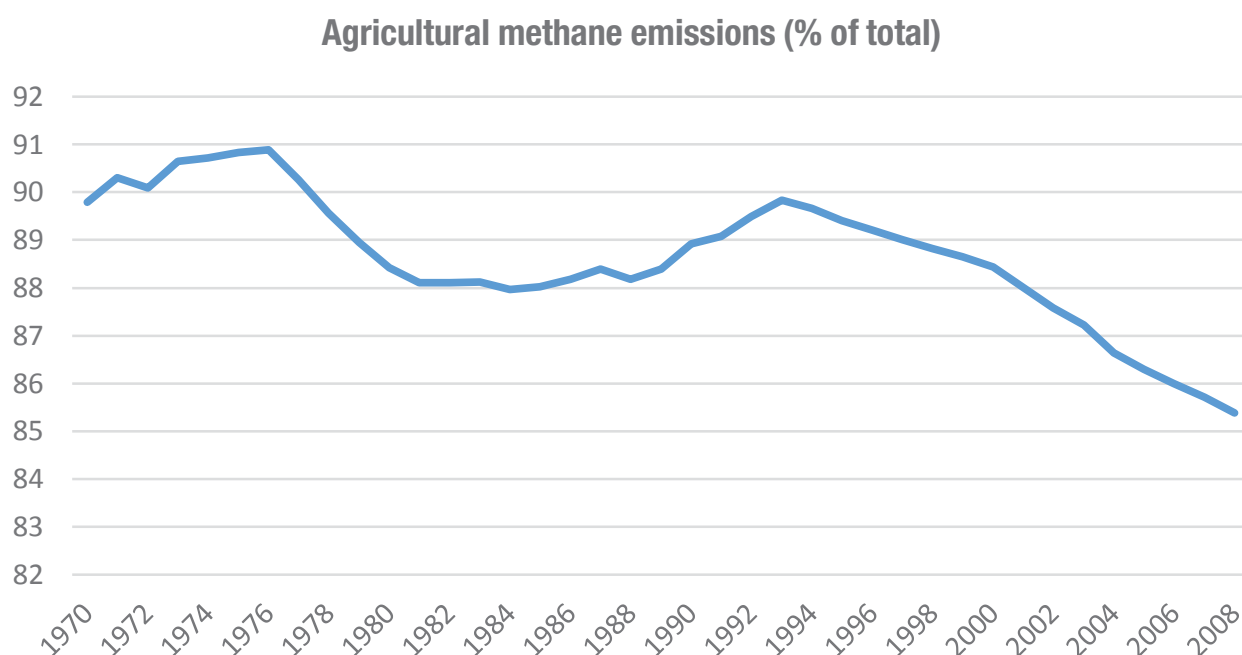


Figure 16: Agricultural methane emissions % of total from 1970s to 2008. (World Bank cited in Vanuatu waste data provided by PacWastePlus-SPREP)

Impact

Without serious global actions to reduce human induced GHG emissions, the planet will continue to warm and weather patterns will be unpredictable but potentially with severe consequences for Vanuatu. Vanuatu's efforts to reduce its carbon footprints and GHG emissions may not be significant from a global perspective but they demonstrate the commitment by the people to inspire and lead others to act now. The challenge for Vanuatu is balancing the development needs of the country and maintaining its low GHG emission status, given the expected population increase.

Response

Vanuatu ratified the Paris Agreement in 2016 and set emission reduction targets. The key component of Vanuatu's Nationally Determined Contributions is the transitioning to 100% renewable energy in the electricity (energy) sector by 2030. Vanuatu has also developed an implementation roadmap and associated institutional framework including a Monitoring, Reporting and Verification (MRV) tool, which aims to enhance Vanuatu's ability to achieve its mitigation NDC target. The overall impact of the programme is for Vanuatu to effectively reduce and monitor its GHG emissions in the energy sector (Third National Communications Report to UNFCCC 2020).

The Ministry of Climate Change Adaptation, Meteorology and Geo-Hazards, Energy, Environment and National Disaster Management (MCCAMGEEDM) is the key agency tasked with Vanuatu's climate change response, natural disasters and sustainable development. The Ministry and the National Advisory Board (NAB) are mandated with coordinating all government and non-government initiatives addressing climate change and disaster risk reduction in the country.

Vanuatu has been very active in implementing renewable energy projects for electricity generation, including solar PV, wind and coconut oil. The Coconut for Fuel Strategy is the key element in providing a sizeable contribution to achieving the NDC target and is the first implementation step to be carried out. Revision of the Electricity Supply Act is a key step for stronger involvement of the private sector and should attract private capital investment into renewable energy projects.

The Department of Energy with the technical assistance from the Pacific Community and funding from the Australian Department of Foreign Affairs and Trade (DFAT) have developed the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016.

The National Energy Roadmap (2016-2030) is one of the key policies that aims to address the GHG emissions of the energy sector, in particular the areas of energy efficiency and green growth.

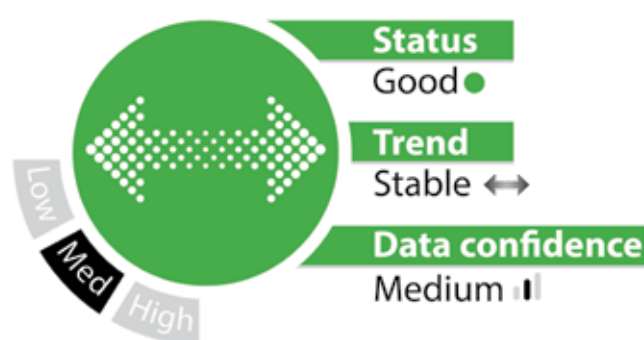
In recent years there have been considerable advances in the use of electric vehicles that could be considered for the main populated areas (Port Vila and Luganville). Personal transport in Port Vila has been much more focussed on cars and mini bus options making electrified transport even more of a good opportunity. The NERM implementation plan aims to develop projects for hybrid/electric vehicles for government vehicles.

Recommendations

Build capacity of staff to continue to monitor and develop GHG emission inventory to help inform management actions

- Raise the awareness of communities and the business sector on what they can do locally to contribute to Vanuatu's renewable energy target
- Engage with development partners to secure assistance in technology development and transfer.
- Continue to undertake research and monitoring on the impacts of climate change on specific sectors such as the agriculture, fisheries, tourism and water sectors.

3.1.2 Ozone Depleting Substances



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS			Montreal Protocol Kigali Amendment	SAMOA Pathway 43 Apia Convention Noumea Convention Waigani Convention	National Sustainable Development Plan ENV 1, 3 & 5.

Indicator definition

The Ozone Layer in the stratosphere helps shield Earth from ultraviolet (UV) radiation from the sun. Since the Industrial Revolution in the 18th Century, various substances emitted by manufacturing and other industrial processes have affected the Ozone Layer. These anthropogenic substances destroy the ozone layer allowing harmful UV radiation to penetrate the earth. Human exposure to UV radiation can cause skin cancer, cataracts, genetic damage and immune system suppression. It can also affect the productivity in agricultural crops and the food chain. The indicator assessed the current management of ODS in Vanuatu.

Status and Key Finding

Vanuatu has completed its ODS survey, which identified the type and quantity of HCFC and HFC being used and the products, equipment and systems in which they are being used (Figure 17) (DEPC 2020).

Vanuatu has banned and phased out the importation and use of chlorofluorocarbons (CFCs), CFC-based manufactured products, halons, carbon tetrachloride, methyl chloroform, hydrobromofluorocarbons, and bromochloromethane (Figure 18).

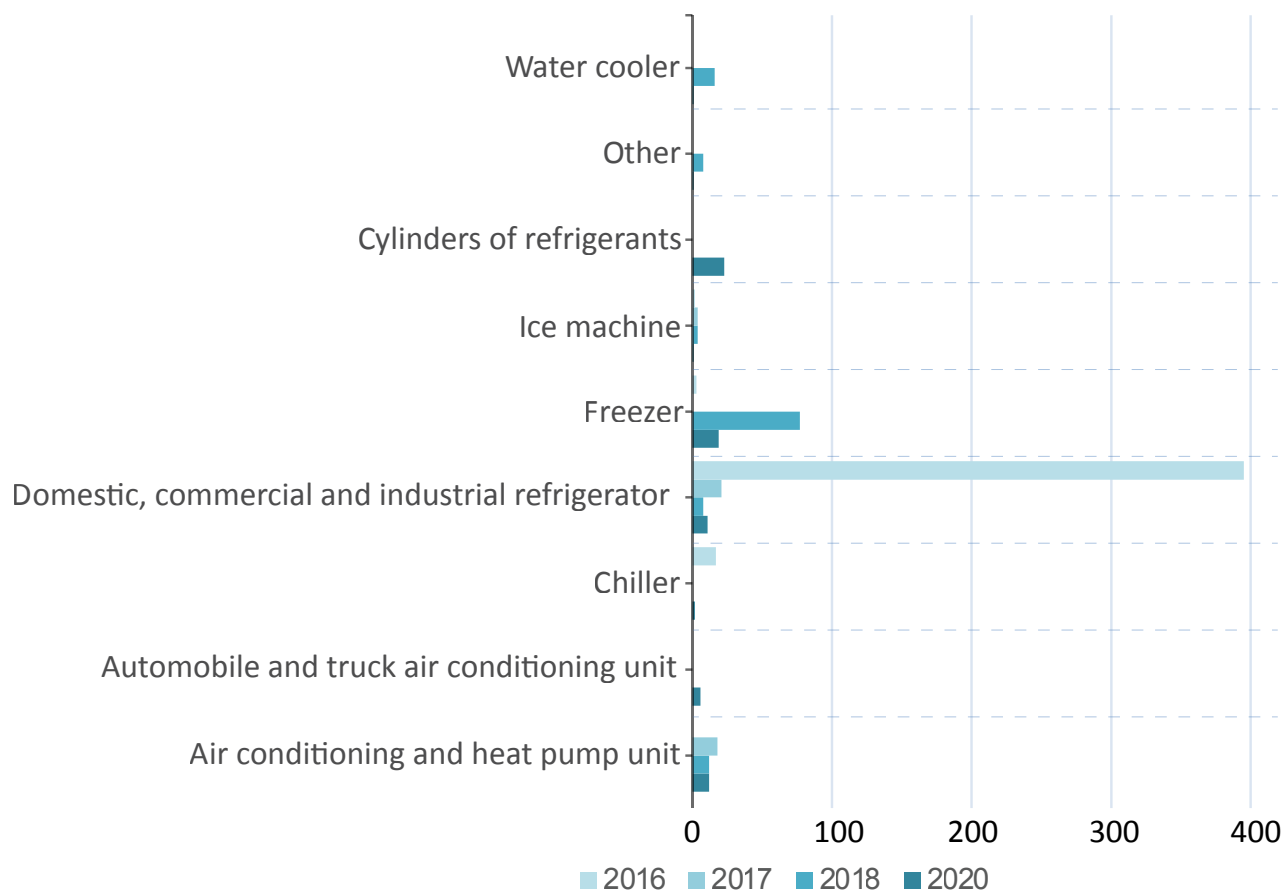


Figure 17: Type and quantity of HCFC and HFC being used and the products, equipment and systems

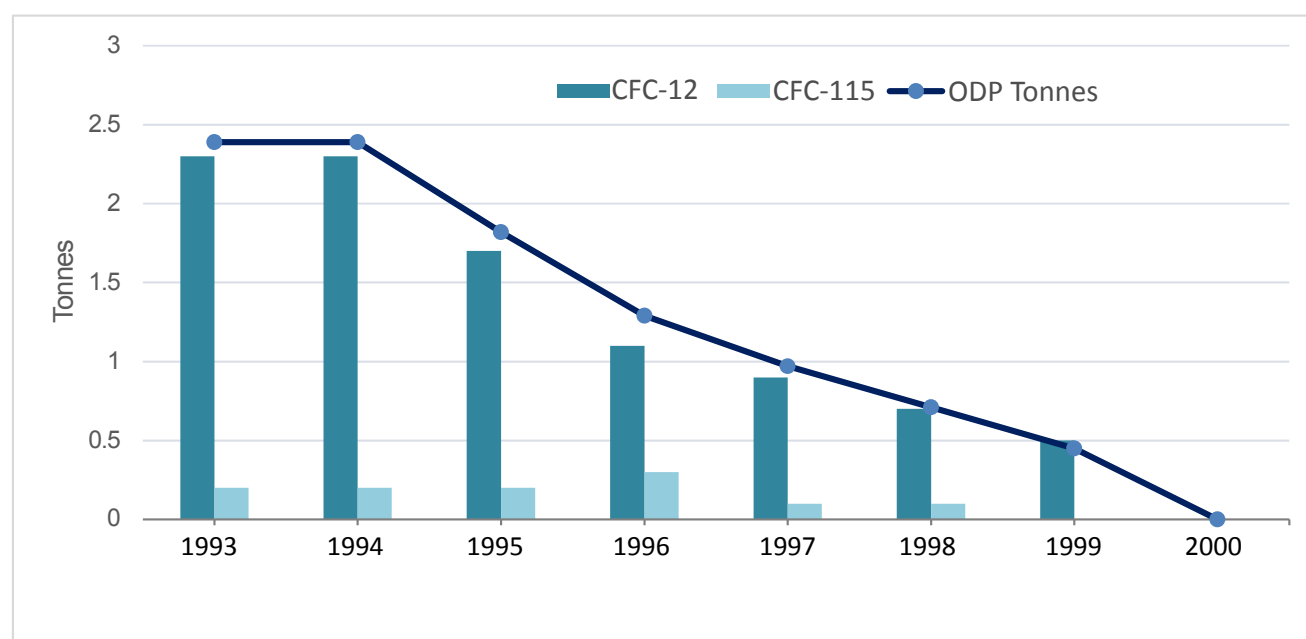


Figure 18: CFC consumption in Vanuatu from 1993 to 2000. (DEPC)

The phasing down of HFC is acknowledged by the country's ratification of the Kigali Agreement. Accordingly, Vanuatu will gradually reduce its HFC consumption by 80% by 2045, and is scheduled to freeze HFC consumption in 2024. Figure 19 provides an overview of ODS importation since 2011. A schedule for the phasing down has been developed (Table 4).

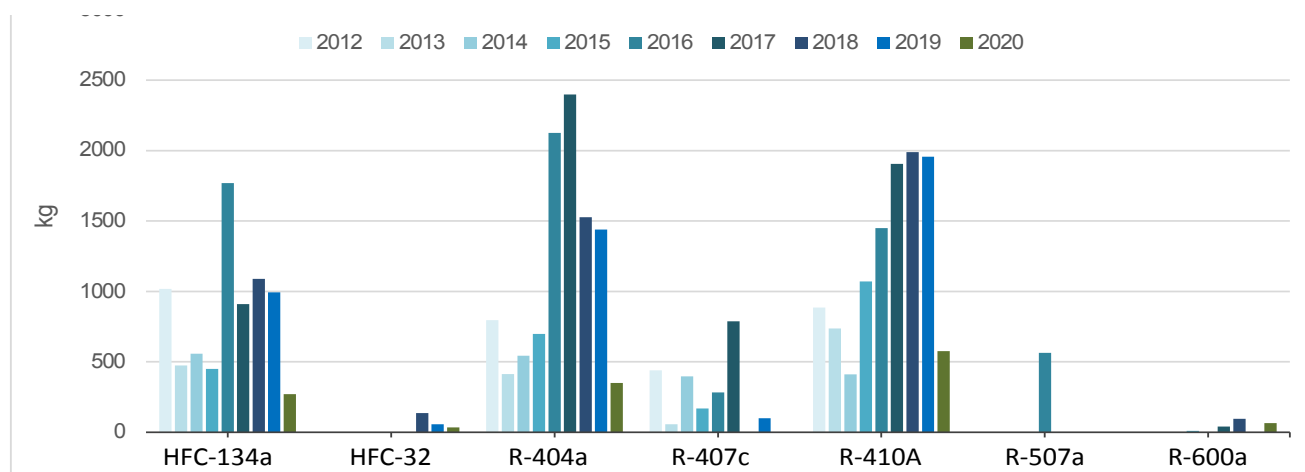


Figure 19: Imported ODS from 2012-2020.

BASELINE YEARS	2020, 2021 AND 2022
Baseline calculation	Average HFC consumption for 2020, 2021, and 2022 plus 65% of the hydrochlorofluorocarbon (HCFC) baseline
Freeze	2024
Step 1	2029 – 10% reduction
Step 2	2035 – 30% reduction
Step 3	2040 – 50% reduction
Plateau	2045 – 80% reduction

Table 4: Vanuatu's timetable for phasing-down HFC consumption. (DEPC 2020)

Vanuatu does not produce nor export ODS. It imports ODS (HCFC-22, HCHC-124, HCFC-142b and CH₃Br) for use in the RAC/MAC industry and fumigation. In 2018, 800 kg of Methyl Bromide (Ch₃Br) and 286 kg of HCFC were imported. The quantity declined in 2019 to 600 kg of Methyl Bromide and 217 kg of HCFC in 2019 (Patterson 2020).

The importation of ODS is regulated by the Government. All importers must be registered with the Government, and the imported quantity must be below the amount specified by the Montreal Protocol's phase out schedule (Table 4).

Impact

If no action is taken against the use of ODS substances, then the earth's ozone will continue to be depleted leading to more harm to humans and biodiversity. The need to raise public awareness and especially the awareness of importers of

Vanuatu's laws, and ensure the penalties are being enforced, will help Vanuatu in managing its ODS commitments.

Response

Vanuatu ratified the Montreal Protocol in 1994, in an effort to phase out the production and use of ozone depleting substances. It has also ratified the Kigali Amendment in agreement to reduce the consumption and production of HFC. It is important to note that Vanuatu does not export or manufacture ODS. The Department of Environmental Protection and Conservation is responsible for managing ODS in the country, under the Ozone layer Protection Act No. 20 of 2019. The Department has set up the institutional framework to phase-out consumption of ODS, as well as to develop policy and legislation, build capacity and develop outreach materials for the public.

Table 5: Vanuatu's response to managing the ODS. (DEPC 2020)

OZONE TREATY	DATE OF RATIFICATION
Vienna Convention for the Protection of the Ozone Layer	21 November 1994
Montreal Protocol on Substances that Deplete the Ozone Layer	21 November 1994
London Amendment to Montreal Protocol	21 November 1994

OZONE TREATY	DATE OF RATIFICATION
Copenhagen Amendment to Montreal Protocol	21 November 1994
Ozone Layer Protection Act No. 27 of 2010Montreal Amendment to Montreal Protocol	21 July 2011
Beijing Amendment to Montreal Protocol	21 July 2011
Kigali Amendment to Montreal Protocol	20 April 2018
Legislation	Year of Commencement
Ozone Layer Protection Act No. 22 of 2019 (repeals the previous Act)	2019
Statutory Order	Year of Commencement
Ozone Layer Protection Regulation Order No. 20 of 2020	2020

Partnership has been a key part of the Government's response, such as the collaboration with the Department of Customs and Inland Revenue and Vanuatu's Single Windows Project, that has allowed the National Ozone Unit to provide the necessary information online (ASYCUDA World system) for the benefit of all importers. Enforcing the legislation is also a key part of the Government response, including the removal of non-compliant products (Figure 20).

Compliance Case Study

The Border Control office at Port Vila Wharf contacted the National Ozone Unit to inspect a company's import of R407 cylinders. The R407 is non-ODS and permitted into the country. Yet when NOU tested the refrigerant identifiers, it found that the cylinders contained R22 (Freon). The containers were seized and the company was issued with a penalty notice.



Compliance Case Study

The Border Control office at Port Vila Wharf contacted the National Ozone Unit to inspect a company's import of R407 cylinders. The R407 is non-ODS and permitted into the country. Yet when NOU tested the refrigerant identifiers, it found that the cylinders contained R22 (Freon). The containers were seized and the company was issued with a penalty notice.

Figure 20: Confiscated goods due to their non-compliance with legislation. (DEPC 2022)

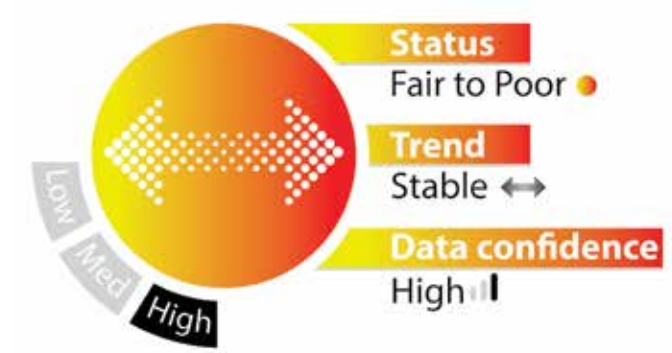
The Ozone Layer Protection Act 2010 was enacted to give effect to the country's obligations under the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol. The Act prohibits and restricts the import, export, manufacture and the sale of controlled substances, as well as providing the permits for approved importers and facilities. The objective of the Act is to protect human health and the environment from adverse effects due to activities which modify the ozone layer, and the phasing out of ODS, except for special uses.

Recommendations

- There is need for comprehensive policy and regulatory measures to promote ODS alternatives. In addition to policy development is capacity development to encourage further understanding and adoption of ODS alternatives.
- Continue to raise the awareness of businesses and importers on the law and their role in managing ODS in Vanuatu.
- Establishment of an import permit system for sale of HCFCs/ODS alternatives through quota systems in place as required under the Act.
- There is a need for more education in schools about the protection of the ozone layer – ozone layer protection should form part of the curriculum, especially in high schools.

3.1.3 Physical Climate Trends

Vanuatu has been subjected to climate variability over millennia. Greenhouse Gas emissions driven by human activities are causing unprecedented warming of the planet, which alters many of the climatic systems that have regulated our climate. This has led to extreme weather conditions such as increased sea surface temperatures, droughts that last for years, flooding and severe storm and cyclonic events.



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 7.2 11.b 13.2	 UNFCCC Montreal Protocol Convention on Biological Diversity	SAMOA Pathway 43	Third National Communication to UNFCCC

Definition

For Vanuatu to respond to future climate challenges, it is important that good information on future climate scenarios are made available to managers and to the community. In particular, the projected climate scenarios and their impact on the environment, the natural resources and the economy must be understood and actions taken to mitigate and adapt to them. The SOE assesses the temperature, rainfall, ocean acidification and sea level rise of Vanuatu, specifically some historical data and future projections.

Status and Key Finding

Temperature

Vanuatu's annual average temperatures are between 23.5 and 27.5°C (Figure 21). Changes in the temperature over the seasons are influenced by the surrounding ocean temperature (Figure 22). The El Niño Southern Oscillation (ENSO) creates variability to Vanuatu's climate bringing drier conditions, as well as a late start to the wet season and cooler than normal dry seasons. The opposite occurs during La Niña events.

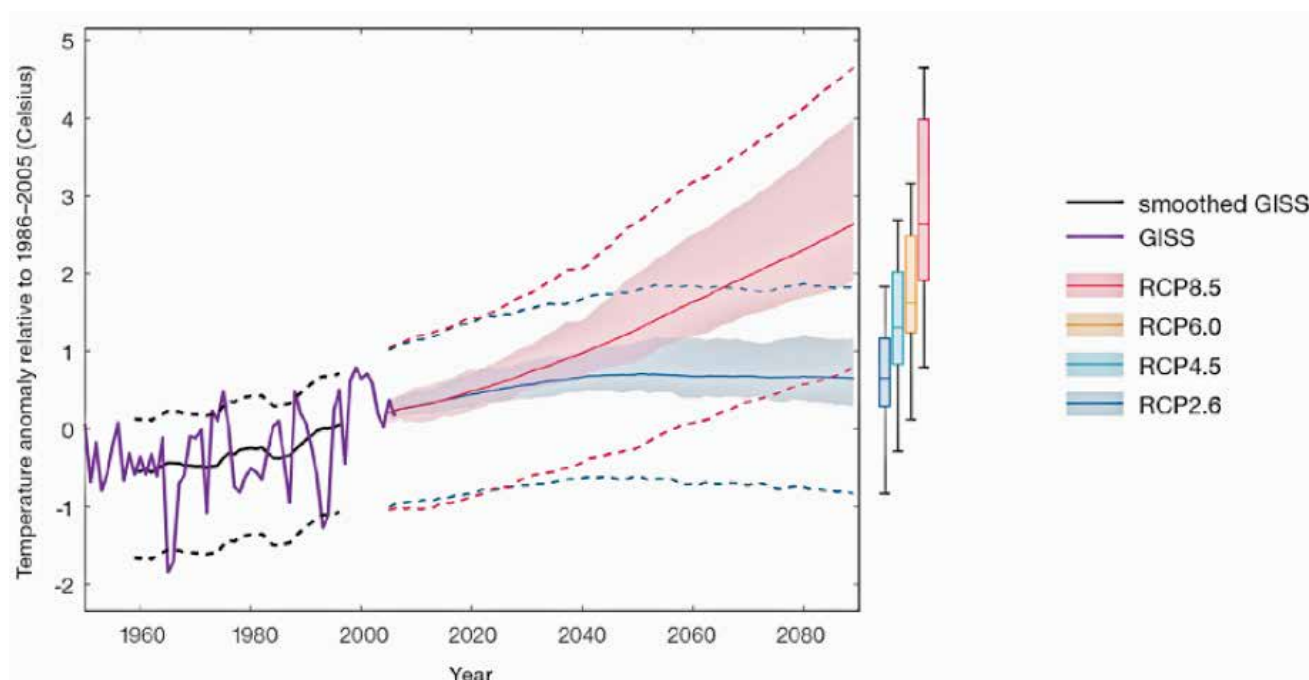


Figure 21: Historical and simulated mean annual surface air temperature for Vanuatu. (Third National Communications Report to UNFCCC 2020)

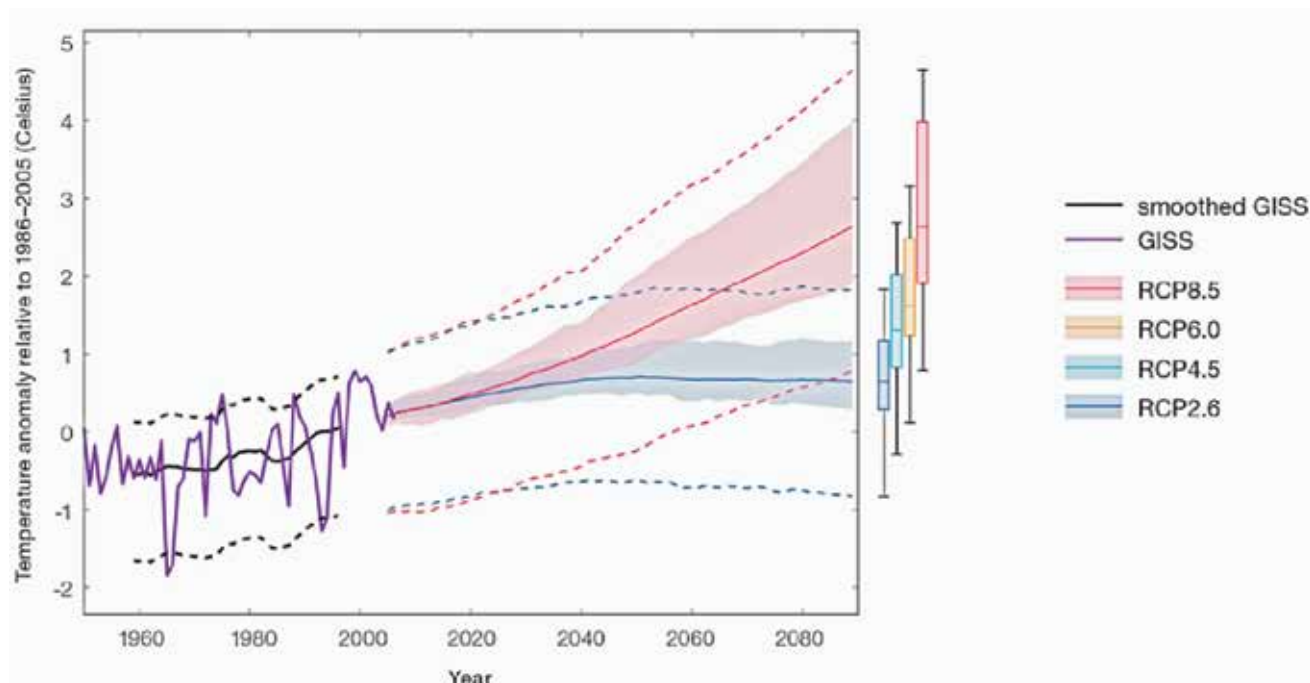


Figure 22: Seasonal temperature and rainfall at Port Vila. (PCCSP 2015)

Vanuatu's annual maximum and minimum temperatures have increased since 1950 (Figure 21). At Bauerfield Airport in Port Vila, maximum temperatures have increased at a rate of 0.17°C per decade and at Aneityum, the rate of increase has been 0.18°C per decade. These temperature increases are consistent with the global pattern of warming.

The projections for all emissions scenarios indicate that the annual average air temperature and sea surface temperature for Vanuatu will increase in the future (Table 6). In a 2°C warmer world, Vanuatu is projected to be 1.3 to 1.9°C warmer compared to the pre-industrial baseline (or 0.7 to 1.3°C from the 1986-2005 baseline (CSIRO 2021). By 2030, under a high emissions scenario, this increase in temperature is projected to be in the range of 0.4–1.0°C. Increases in average temperatures will also result in a rise in the number of hot days and warm nights and a decline in cooler weather.

Table 6: Projected changes in the annual average surface air temperature for Vanuatu. (PCCSP 2015)

VANUATU'S PROJECTED TEMPERATURES	2030 (°C)	2055 (°C)	2090 (°C)
Low emissions scenario	0.2-1.0	0.5-1.5	0.7-2.1
Medium emissions scenario	0.3-1.1	0.8-2.0	1.3-3.1
Very high emissions scenario	0.4-1.0	1.1-1.7	2.0-3.2

Rainfall

Rainfall in Vanuatu is affected by the South Pacific Convergence Zone. This band of heavy rainfall is caused by air rising over warm waters where winds converge, resulting in thunderstorm activity. It extends across the South Pacific Ocean from the Solomon Islands to east of the Cook Islands (Figure 23). During the wet season the South Pacific Convergence Zone intensifies and moves further south, bringing higher rainfall to Vanuatu. Low pressure systems embedded in this band of heavy rainfall often become tropical cyclones during the cyclone season.

Mountains also play a role in the variations in rainfall across some islands. During the wet season, rainfall is particularly high on the windward (south-east) side of the mountain ranges of the bigger islands, and scarce on the leeward (north-west) sides, especially during the dry season (Figure 22).

Data since 1950 for Port Vila show a decreasing trend in wet season rainfall (Figure 24). However, there are no clear trends in annual and dry season rainfall at Port Vila or annual and seasonal rainfall at Aneityum. Over this period, there has been substantial variation in rainfall from year to year at both sites.

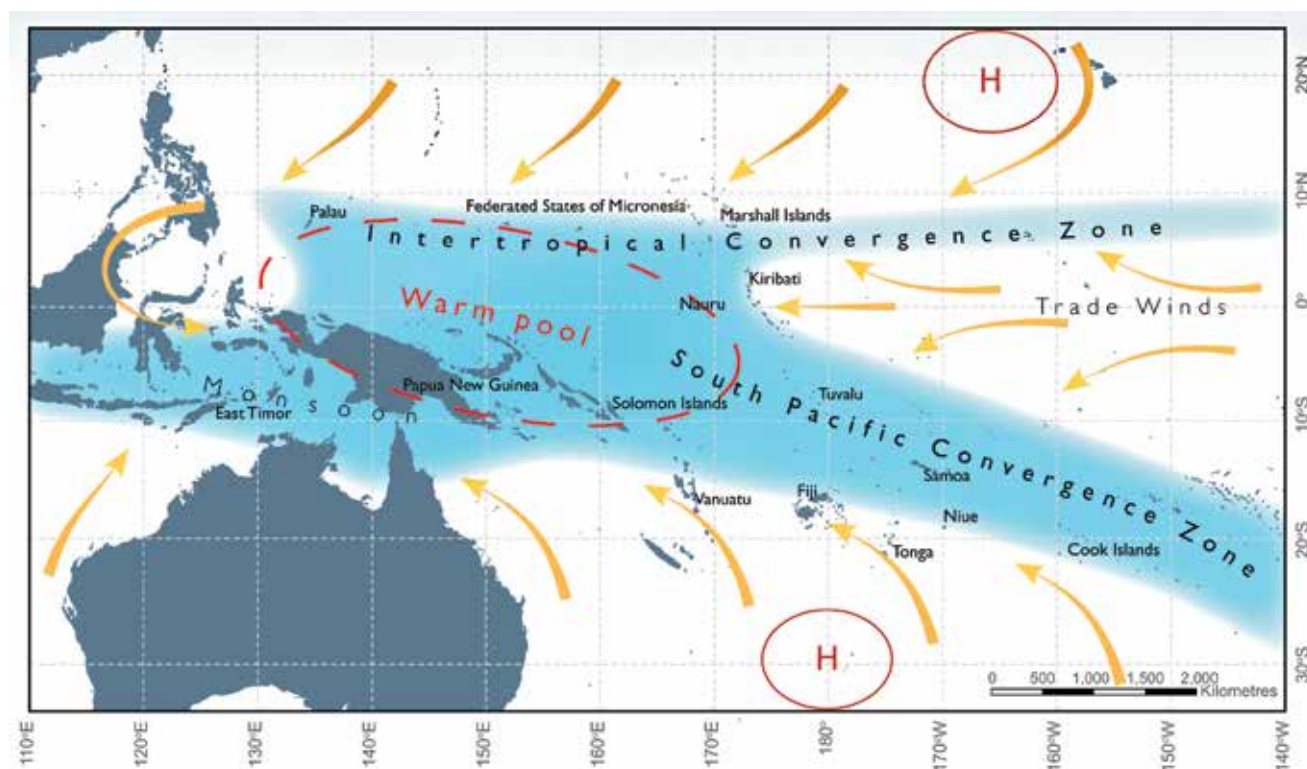


Figure 23: The major climate features during November to April. The arrows show near surface winds, the blue shading represents that bands of rainfall convergence zones, the dashed oval shows the West Pacific Warm Pool and H represents typical positions of moving high pressure. (PCCSP 2015)

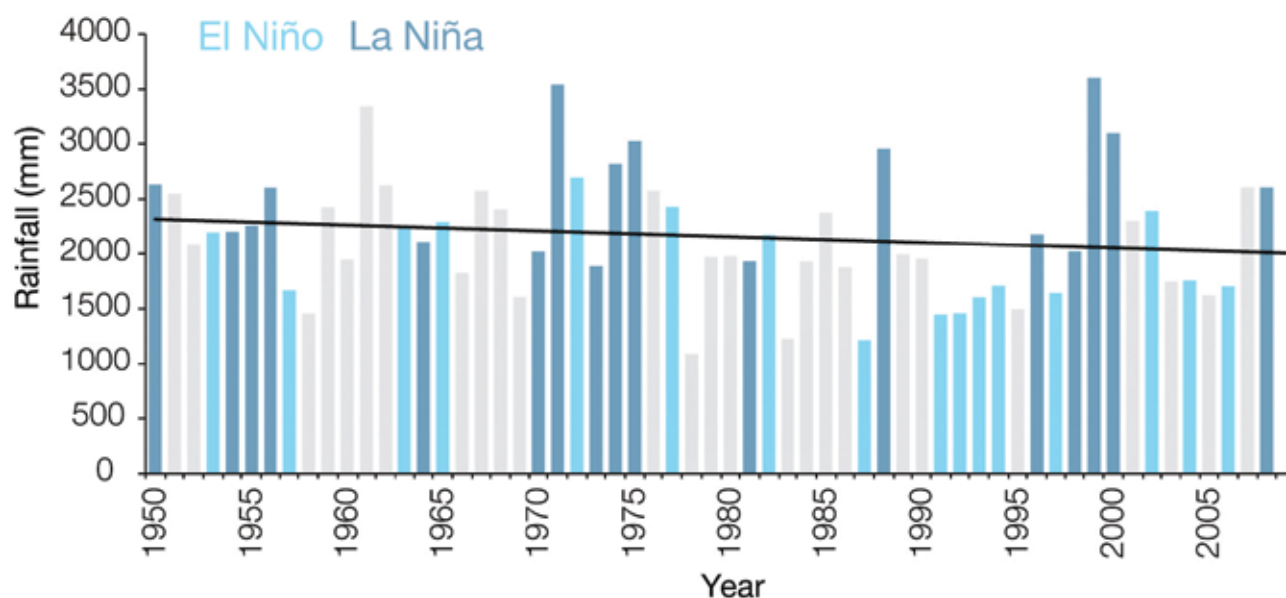


Figure 24: Annual rainfall for Port Vila. Light blue bars indicate El Niño years, dark blue bars indicate La Niña years and the grey bars indicate neutral years. (PCCSP 2015)

There is uncertainty around rainfall projections as model results are not consistent. However, projections generally suggest a decrease in dry season rainfall and an increase in wet season rainfall over the course of the 21st century. Increased wet season rainfall is expected due to the projected intensification of the South Pacific Convergence Zone. Drought projections are inconsistent for Vanuatu. Model projections show extreme rainfall days are likely to occur more often.

Ocean Acidification

The oceans have become 30% more acidic than they were at the beginning of the industrial revolution some 250 years ago, by absorbing increased amounts of atmospheric carbon dioxide. Carbon dioxide reacts with seawater making it acidic. An acidic ocean environment will affect marine organisms that have calcium carbonate as part of its life cycle or structure. These species are critical to the balance of tropical reef ecosystems. Data show that since the 18th century the level of ocean acidification has been slowly increasing in Vanuatu's waters.

Ocean acidification projections for the Pacific are based on an assessment undertaken by Johnson, Bell and Gupta (2016). According to the authors, modelling is suggesting that by 2050, about 85% of coral reefs will struggle to grow due to high pH levels. Oceans are currently absorbing about 2 Gigatons of carbon annually and the average ocean pH is now 8.1 (varying seasonally and spatially by 0.3 pH units).

Under climate projections using three emissions scenarios (low, medium and high), the acidity level of sea waters in the Vanuatu region will continue to increase over the 21st Century, with the greatest change under the high emissions scenario. The impact of increased acidification on the health of reef ecosystems is likely to be compounded by other stressors including coral bleaching, storm damage and fishing pressure.

Cyclones

Tropical cyclones affect Vanuatu between November and April. In the 41-year period between 1969 and 2010, 94 tropical cyclones passed within 400 km of Port Vila, an average of two to three cyclones per season (Figure 25). From 1990 to 1999, Vanuatu experienced more cyclones than any other Pacific country, with an average of 2.6 cyclones per year. A recent study also shows that Vanuatu is vulnerable to severe cyclones during the early stages of El Niño, as was the case with the severe tropical Cyclone Pam in March 2015. During La Niña, cyclone activities shift to the Coral Sea, however, any system formed in the Coral Sea could often traverse south-eastward towards Vanuatu (Khan et al. 2014).

By the end of this century projections suggest decreasing numbers of tropical cyclones. However, there is likely to be an increase in the average maximum wind speed of cyclones by between 2% and 11% and an increase in rainfall intensity of about 20% within 100 km of the cyclone centre.

In the Vanuatu region, projections show a decrease in the frequency of tropical cyclones by the late 21st Century and an increase in the proportion of the more intense storms, but with a possible shift towards more intense categories (PCCSP 2015).

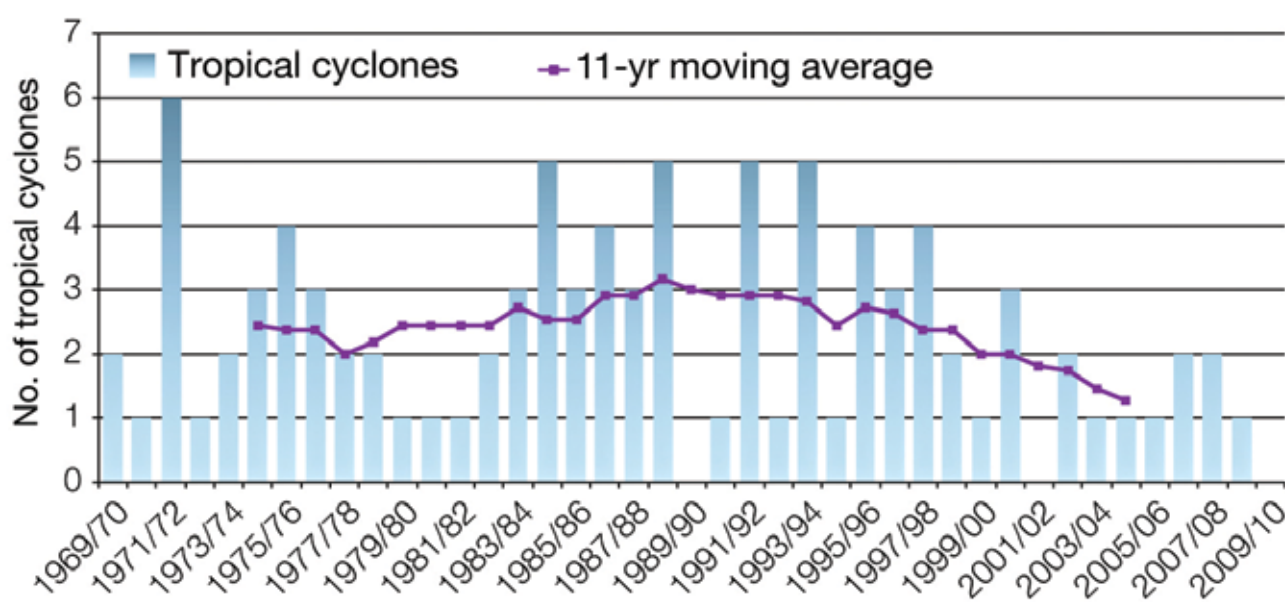


Figure 25: Number of tropical cyclones passing within 400 km of Port Vila. Eleven-year moving average in purple. (PCCS, 2015)

Sea Level Rise

As ocean water warms it expands causing the sea level to rise. The melting of glaciers and ice sheets also contributes to sea level rise. Instruments mounted on satellites and tide gauges are used to measure sea level. Satellite data indicate the sea level has risen near Vanuatu by about 6 mm per year since 1993. This is larger than the global average of 2.8–3.6 mm per year. This higher rate of rise may be partly related to natural fluctuations that take place year to year or decade to decade

caused by phenomena such as the El Niño-Southern Oscillation. This variation in sea level can be seen in Figure 26 which includes the tide gauge record and the satellite data since 1993.

Sea level is expected to continue to rise in Vanuatu through the 21st Century, with models showing a very high confidence in this trend (Table 7). By 2030, under a high emissions scenario, this rise in sea level is projected to be in the range of 3-17 cm. The sea level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding. As there is still much to learn, particularly how large ice sheets such as Antarctica and Greenland contribute to sea level rise, scientists warn larger rises than currently predicted could be possible.

Table 7: Sea Level Rise projection for Vanuatu. (PCCSP 2015)

VANUATU'S SL RISE	YEAR 2030	Year 2050	Year 2090
Low emissions scenario	5-16 cm	10-27 cm	17-47 cm
Medium emissions scenario	5-16 cm	8-31 cm	20-59 cm
Very high emissions scenario	3-17 cm	7-31 cm	21-63 cm

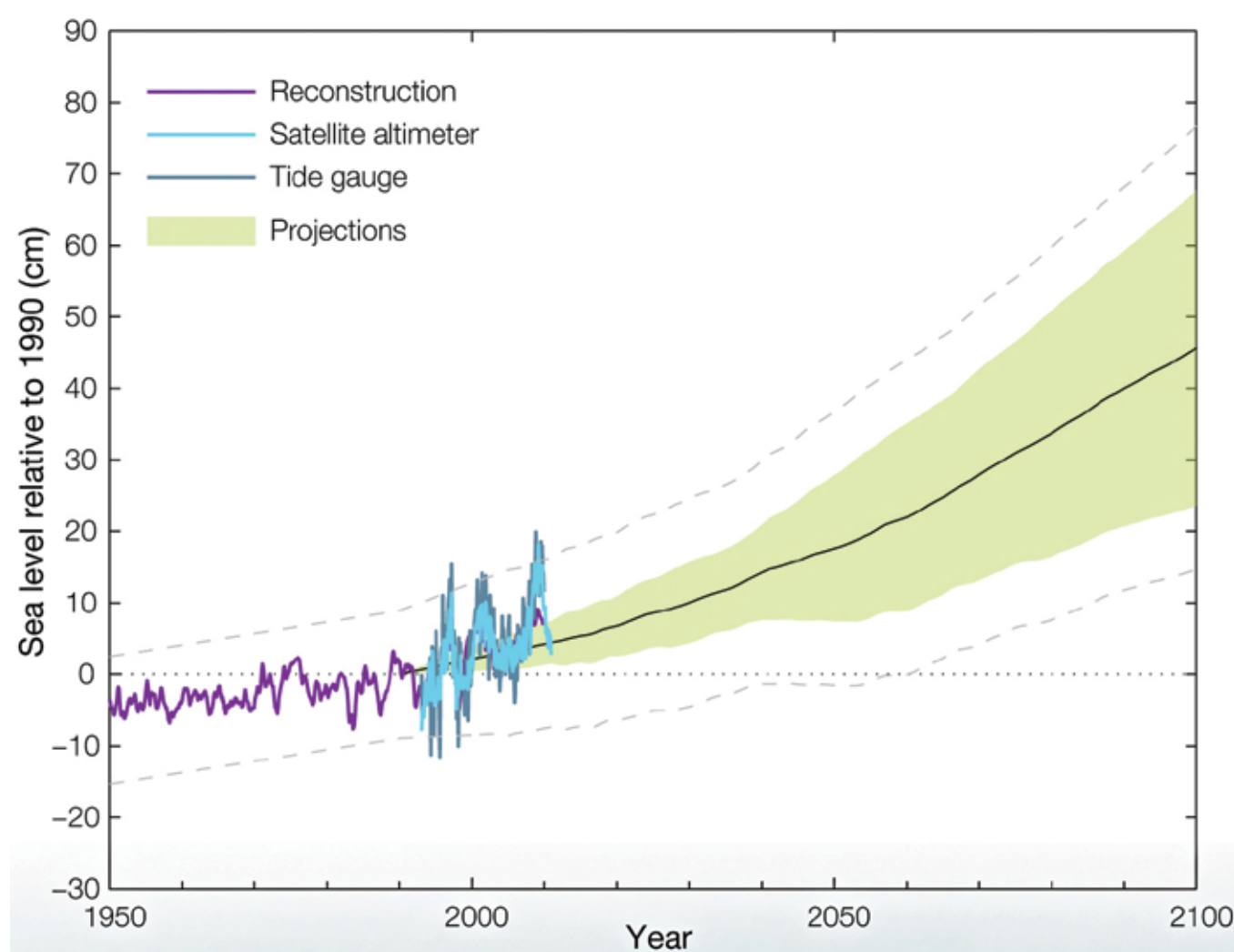


Figure 26: Observed and projected relative sea level change near Vanuatu. The observed sea level records are indicated in dark blue (relative tide gauge observations) and light blue (the satellite record since 1993). Reconstructed estimates of sea level near Vanuatu since 1950) are shown in purple. The projections for the A1B (medium) emissions scenario (representing 90% of the range of models) are shown by the shaded green region from 1990 to 2100. The dashed lines are an estimate of 90% of the range of natural year-to-year variability in sea level. (PCCSP 2015)

Impact

The climate projections unfortunately are showing that many of the physical climate trends will not be favourable to communities throughout Vanuatu. The physical climate parameters will not only have direct impacts on communities, but they will also have a domino effect on Vanuatu's infrastructure and key sectors. The challenge is global and it is through working together that some solutions may be possible that will give Vanuatu communities, and many others throughout the Pacific, a fighting chance.

Response

There are currently 47 operational meteorological stations in Vanuatu. Multiple observations within a 24-hour period are taken at Sola, Pekoa, Saratamata, Lamap, Bauerfield, Whitegrass and Alaguhahat (Aneityum). At three climate stations (Lambubu, Lamap and Aneityum) and at 39 rainfall stations across the country, a single observation is taken at 9.00 am local time. The primary climate stations are located at Port Vila and Bauerfield Airport on the island of Efate. Several stations, including Iririki (Port Vila), have rainfall data from the early 1900s. Iririki also has the earliest air temperature observations which began in the late 1940s. An Iririki-Port Vila-Bauerfield composite has been created and named Bauerfield Airport. Bauerfield Airport monthly rainfall from 1907 (daily values from 1949) and air temperature from 1949, and Aneityum rainfall and air temperature from 1948 have been used in this report.

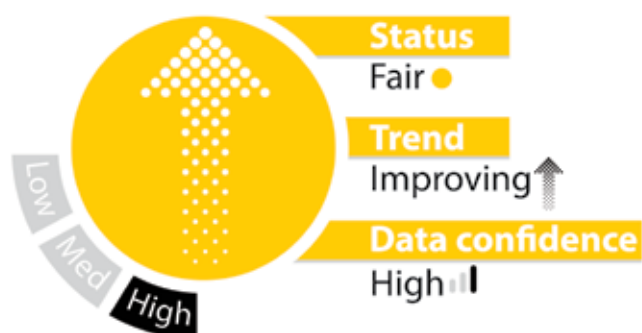


Weather observation station at Port Vila.
(Vanuatu Meteorological Office)

Recommendations

- Build local capacity to undertake research, monitor, analyse and interpret weather information to assist with informing on actions needed to safeguard communities and natural assets.
- Continue to advocate globally on stronger actions and measures to curtail the rise in GHG emissions, as well as assistance for adaptation and mitigation efforts.

3.1.4 Climate-related disaster loss



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	  	   7.2 11.b 13.2	 UNFCCC	SAMOA Pathway 43	Third National Communications Report to UNFCCC

Indicator definition

Vanuatu faces a number of geological and climatic natural hazards. The Commonwealth Vulnerability Index (CVI) ranks Vanuatu the world's most vulnerable country of 111 developing countries assessed. As such, Vanuatu still has UN Least Developed Country (LDC) status, despite a per capita GDP above the LDC threshold. The climate of Vanuatu is inherently uncertain, being subject to climatic variability and extremes. Vanuatu's latitude places it in the path of tropical cyclones (November to May), and it is subject to cycles of El Niño and La Niña, which, respectively, increase the risks of droughts and floods. Climate related disasters include earthquakes, heatwaves, cyclones, storms, floods, droughts and sea level rise. Some of the issues are also covered in previous indicators. The indicator assesses the threat of natural disasters to some of the key sectors in Vanuatu.

Status and Key Findings

Vanuatu is one of the most vulnerable countries in the world. Natural hazards affecting Vanuatu include droughts, floods, extreme temperatures, heat waves, earthquakes, tsunamis, storm surges and cyclones (Figure 27 and Figure 28). The impacts of these disasters include lives lost or injury, loss of infrastructure, loss or degradation of natural resources and ecosystems thereby impacting fisheries and agricultural production, which exacerbates food and water security. Traditional communities and societal values will be impacted as well as the tourism sector, which affects the national economy.

Adaptation and disaster risk reduction efforts are hampered by Vanuatu's lack of economic independence, high community dependence on subsistence agriculture, and its inaccessible location. Climate change threatens to drive poverty and inequality (World Bank Group 2021).

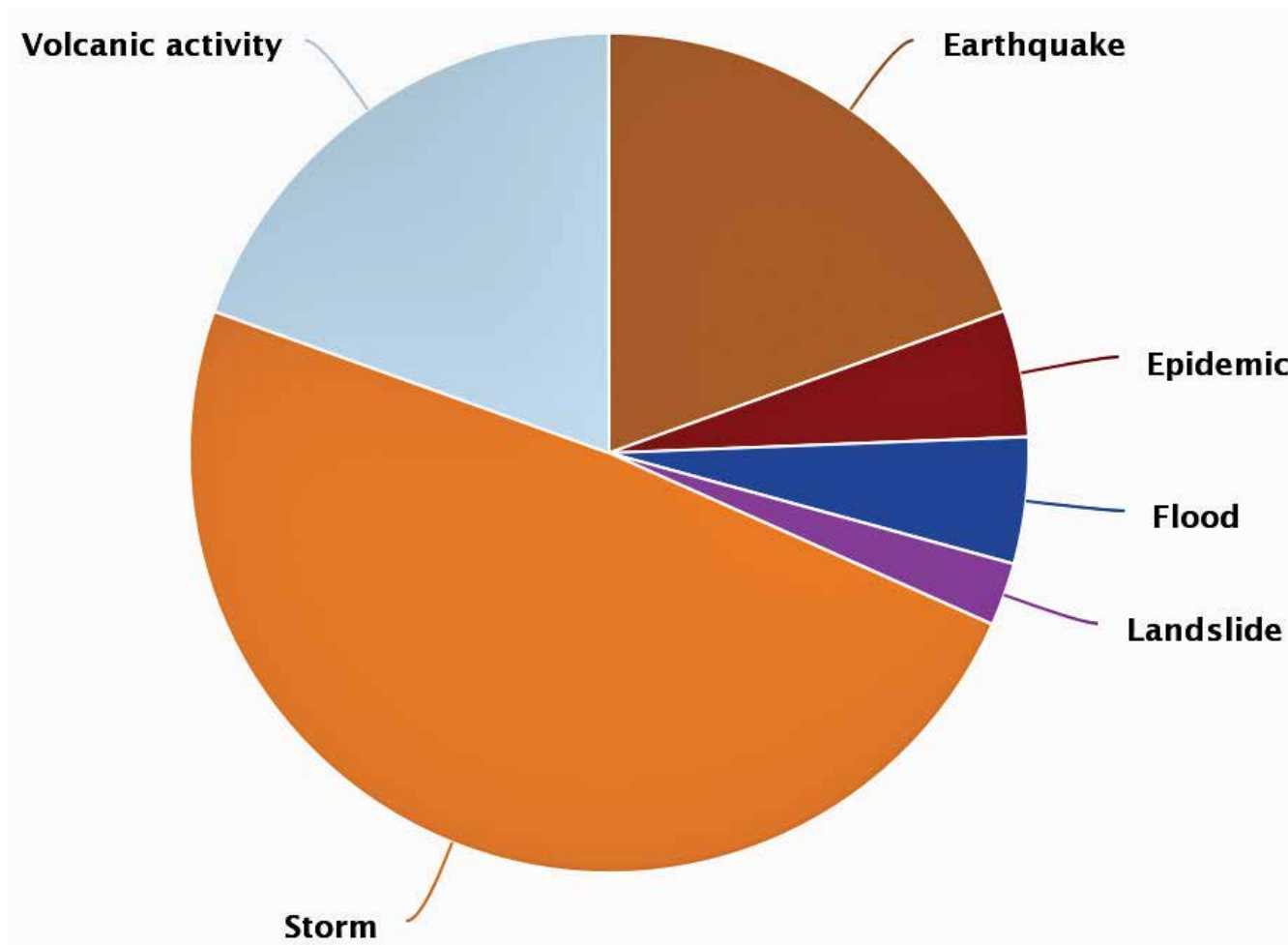


Figure 27: Average Natural Hazard Occurrence for 1980-2020

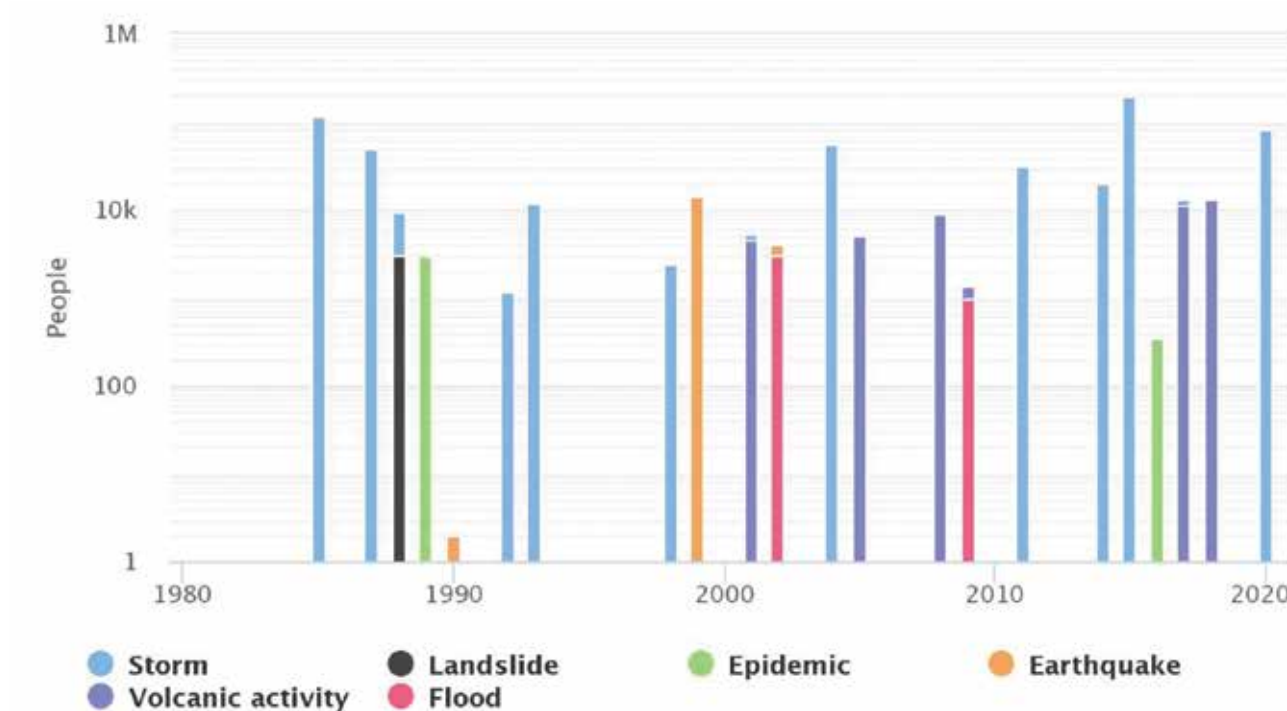


Figure 28: Key natural hazard statistics for 1980 to 2020 period.
(Third National Communications Report to UNFCCC 2020)

Heat Waves

Projected climate changes are expected to push temperatures from the current 27-28°C to above 30°C on a regular basis. The potential for marine heat waves is likely given the climate projections of increasing temperatures. Research has identified the Western Tropical Pacific as a global hotspot for climate change impacts on marine heat waves. Marine heat waves are projected to grow in duration and intensity. The consequences of this trend may be serious for marine ecosystems in the region, which are adapted to survive under very stable temperature regimes.

Drought

Two types of drought may affect Vanuatu: meteorological (usually associated with a precipitation deficit) and hydrological (usually associated with a deficit in surface and subsurface water flow). Meteorological drought is expected to increase in frequency, with one study suggesting a potential doubling in the frequency of severe and extreme droughts by the 2080s under very high emissions (or RCP8.5). This represents a major risk as there is very high dependence on rainwater for subsistence.

Flood, Cyclones, and Storm Surge

Vanuatu has very high exposure and vulnerability to the impact of floods, tropical cyclones, and storm surges, which can strike in combination or in isolation. Up to 30 cyclones pass over Vanuatu every decade but around three to five cause severe damage. One of the severest cyclones that hit Vanuatu was Cyclone Pam in 2015. Eleven lives were lost, 17,000 buildings destroyed, and 65,000 people displaced. The economic cost of Cyclone Pam was estimated at 64% of the GDP (NABCCDRR 2015).

Natural disasters and hazards are likely to be exacerbated by climate change. The exact nature of this combination is yet to be fully understood. However, there are known risks such as rising sea levels, which can enhance storm surges, or the increase in wind speed interacting with precipitation intensity. Both can result in damages to infrastructure and a risk to human life. Vanuatu already has a significant population and asset base exposed to flooding of different types. Many of Vanuatu's population and infrastructure are exposed to flooding from rivers and storm surges. This exposure is expected to increase as climate change causes the sea level to rise.

Agriculture and Food

Agriculture is important to the people's subsistence living. Climate change impacts to the agriculture sector will affect all households throughout Vanuatu, especially in terms of their food security. Vanuatu's economy remains strongly oriented towards agriculture. Food products constituted around 85% of exports in 2011. Similarly, its food trade deficit and dependence on imports for food security were equivalent to over USD50 per capita in 2011 giving it high vulnerability to price shocks and disaster events (WITS 2019). One third of arable land is being cultivated, with most being used for coconut plantations. Copra, which is the kernel inside coconuts, accounted for 35% of Vanuatu's exports in 2007. Coconuts are also consumed by locals as food, drink, animal feed and construction materials (MALFFB Vanuatu 2021).

Agricultural activities in Vanuatu are particularly susceptible to induced changes in precipitation patterns (as most cropping practices are rain-fed), extreme rain or drought events, salinisation processes, increases in evapotranspiration, seasonal variations, and reduction in fresh water availability (Ministry of Climate Change 2020). Multiple climate-linked drivers threaten the productivity of the agricultural sector. Saltwater intrusion poses a danger to food production with much of the cultivated land situated in coastal areas. Cyclones can also cause devastating damage to agricultural crops, as with other extreme weather conditions and phenomenon.

A further and perhaps lesser-appreciated influence of climate change on agricultural production is through its impact on the health and productivity of the labour force. Vanuatu currently operates an agricultural system highly dependent on physical labour inputs and hence is potentially vulnerable to higher temperatures without adaptation. This will have a considerable impact on national food security.

Forestry

With a total of 36% of Vanuatu's landmass, the forest cover is high and it makes the country a net carbon sink. Forests have contributed to the welfare and economic developments of the nation. The effect of climate change on Vanuatu's forests is yet to be assessed. However, drawing on relevant impact projections, it can be expected that climate-induced changing precipitation trends, temperature and seasonal variability, and intensified extreme weather events create significant additional stress on many forest species. This can lead to changed ecosystem composition and decline in plant density or migration of some faunal species. Forest fires may be a possibility, especially if there are conditions of prolonged droughts and warmer temperatures with low precipitation.

Tourism

The tourism sector is important to the country, providing around 40% of the nation's GDP. The sector relies heavily on the unique land and seascape, as well as the culture as its key marketing strategy. With projected changes to the climate and their impacts on Vanuatu's natural environment, there is a significant risk to the tourism sector. Marine life, including coral reefs, will be impacted by an acidic ocean or by elevated sea water temperatures. Corals may not be able to recover from increased bleaching events due to the high sea water temperatures. Erosion of the coast from storm surges and rising sea levels will make much of the infrastructure, especially tourism hotels located along the shoreline, uninhabitable or extremely vulnerable. This cumulative impact on the marine and coastal environment will affect the marine biodiversity, especially seafood resources. This will cause food insecurity for the community, but will also affect the food supply to the tourism industry. People's traditional diets may be affected, with more households purchasing processed foods from shops. Many of the processed foods have contributed to the increase in non-communicable diseases in Vanuatu and other Pacific island countries. The projected extreme droughts in between extreme rainfall, landslides and erosion will make some of the tourism sites inaccessible. Energy use will likely increase due to frequent heat waves, and this can be a cost burden to tourism operators. The tourism sector will likely be in conflict with other sectors, as it struggles to adapt to a change in national priorities, and to a changing climate. There is a need for more research in this area, so that the tourism industry and the relevant Government agencies are informed and strategies employed to mitigate any future threats.

Human Health

Climate change effects on human health are both direct and indirect, and are expected to exacerbate especially in the most vulnerable communities, where the burden of disease is already high. Natural disasters can have both short and long-term effects on human health, including loss of life, injuries, prevalence of disease transmissions, and health problems associated with deterioration of the quality and quantity of food and water. A study in 2016 recognised some of the health impacts on Vanuatu due to extreme weather events. Research has placed a threshold of 35°C (wet bulb ambient air temperature) on the human body's ability to regulate temperature, beyond which even a very short period of exposure, can present risk of serious ill-health and death. Temperatures significantly lower than the 35°C threshold of 'survivability' can still represent a major threat to human health. Climate change is expected to push global temperatures closer to 'danger zone' temperature, both through slow-onset warming and intensified heat waves.

Water Security

Water security has always presented a challenge for households in Vanuatu. Access to water varies depending on the islands topography. High and large volcanic islands have some rivers, streams and catchments that respond rapidly to rainfall events. Water catchment areas generally have restricted storage capacity. Groundwater is found in some islands, although for smaller islands there is a high risk of the groundwater being inundated by sea water. The low-lying islands face an enormous challenge with water security. Wet season rainfalls provide the majority of water supplies to remote communities. However, El Niño conditions can shift rainfall patterns, causing a significant decrease in rainfall and leading to drought conditions. Access to clean water continues to improve (just under 45% of the population in 2016) (Macrotrends 2022) (Figure 29). According to a 2009 census conducted by the Vanuatu National Statistics Office, the source for water varies depending on the activity, as well as whether a household is in a rural or urban centre. Urban households share or have private piped water for drinking and washing. Rural households collect rainfall in tanks for drinking.

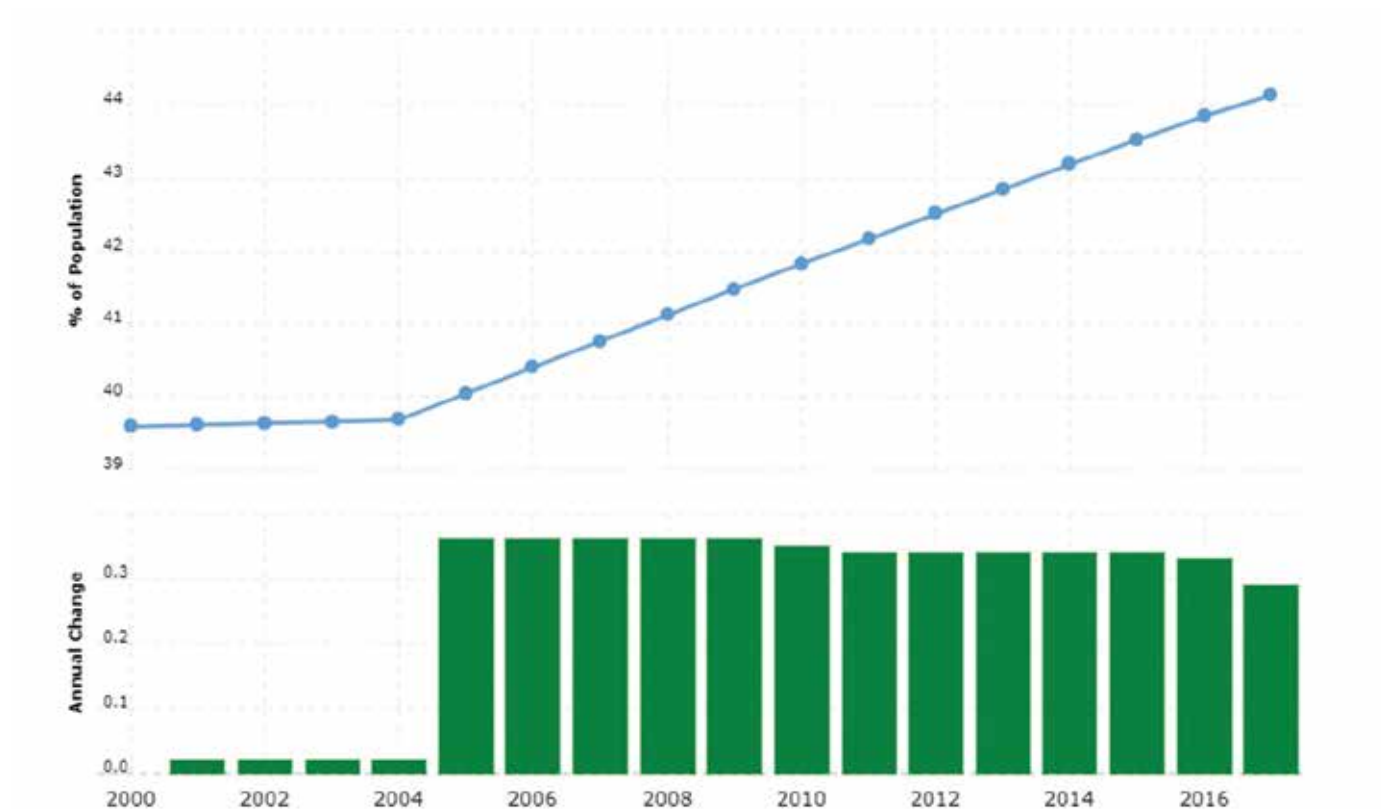


Figure 29: Vanuatu's access to clean water for the 2000-2017 period. Macrotrends 2022

Gender

Vanuatu is traditionally a male-dominated and largely patriarchal society. Very few women enter the public domain, including politics and positions of seniority for decision-making in both public and private sectors. However, there has been notable progress with an increase of women in senior management in the public sector of 3.4% in 2016 compared to 0.3% in 2010. Due to prevailing gender inequalities and social norms, women and children are disproportionately affected by climate change and disaster impacts. According to the Vanuatu National Statistics Office (2016), more women than men (49% and 41%, respectively) are involved in the subsistence economy, and there are more female-headed single parent households with children, grandchildren or extended family members compared to men. Women consequentially are more vulnerable and face higher poverty risks as a result of climate change in areas of food security, energy access and water scarcity.

1999 Tsunami

On 26 November 1999, a 7.5 magnitude earthquake struck central Vanuatu, generating a tsunami that killed five people and caused major damage to nearshore infrastructure. The tsunami is thought to have been generated by a submarine landslide in the Selwyn Strait (between Pentecost and Ambrym), highlighting the impact that these out-of-sight structures can have on life on land



Tanna Ash Fall



Over 28,000 people and 5,650 households affected



Crops destroyed and livelihoods threatened



KEY DATES

March 13 - Warning of increased volcanic activity

April 11 - Government response activation to severe impact of ash fall

Tropical Cyclone Harold

Severely impacted the northern provinces of Sanma, Malampa and Penama, including Santo, which is home to the country's second largest city, Luganville

70% of the structures in Luganville damage

160,000 individuals affected

3 people died and over 56 injured

17,347 houses severely damaged or destroyed

87,000 people without homes

36,985 people's shelter needs not met

81 damaged health facilities

Most stocks and food crops damaged or destroyed

KEY DATES

April 3 - Yellow alert issued for Torba and Sanma

April 4 - Alert upgraded to red for Malampa, Penama, Sanma, and Torba. COVID-19 travel and social distancing restrictions lifted to support evacuations

April 6 and 7 - TC Harold strikes Vanuatu

April 9 - COM approves all ministries to prioritize responses. NDMO announces locally managed response.

April 10 - NDMO assessment teams travel to affected areas

April 11 - Royal New Zealand Air Force delivers first round of relief items

April 13 - First round of Australian humanitarian supplies delivered by Australian Defence Force flight

Impact

The effects of natural hazards and disasters are likely to be exacerbated by climate change. Hazards such as floods, droughts, cyclones, earthquakes, tsunamis and volcanic activities are likely to continue to occur. If these are combined with other climatic factors (sea level rise, temperature rise, precipitation, wind, etc.) driven by global warming, the devastation that it could cause to Vanuatu could be very severe. Rural communities will be impacted, especially if natural resources (crops, agriculture, and fisheries) are affected by the disaster and access to relief supplies is severed over a period.

Response

Vanuatu's response to climate and natural disaster loss uses a multi-pronged approach, starting with prioritising climate change and disaster management in the Vanuatu 2020 – the People's Plan. (National Sustainable Development Plan 2016-2030). Under the Environmental Goal, enhancing Vanuatu's resilience and capacity to address climate change and natural disasters is a priority. Goal 3: Climate and disaster resilience ensures that the capacity and awareness on climate change and disaster risk are institutionalised. Furthermore, the Climate Change and Disaster Management goal advocates for having good monitoring and early warning systems, as well as strengthening post-disaster systems in planning, preparedness, response and recovery. Other national documents that provide the framework to allow the nation, agencies and partners to respond to climate change and disaster impacts include:

- First Nationally Determined Contribution (NDC) (2020)
- Intended Nationally Determined Contribution (INDC) (2016)
- Climate Change and Disaster Risk Reduction Policy 2016–2030 (2015)
- National Adaptation Programme for Action (NAPA) (2007)

Recommendations

- Preparedness is vital for the protection of Vanuatu lives and infrastructure. Having many of the key policies and plans developed is a vital step. Implementation is critical as part of the country's preparedness. Vanuatu needs support to implement these policies and plans. The support includes capacity building, provision of resources, financial support, awareness and outreach programmes to regional and rural communities.
- Research and data collecting are also an important part of the country's preparation and response. While modelling and developing projections are useful in the country's preparation, the on-the-ground learning especially in the recovery phase after a disaster, is critical in refining Vanuatu's response plan and strategy.

Atmosphere and Climate References

CSIRO, 2021. Current and future climate for Vanuatu: enhanced 'NextGen' projections Technical report. Melbourne, Australia: <https://doi.org/10.25919/hexz-1r10>

DEPC, 2017. Ozone Depleting Substances Alternative Survey Report. Vanuatu. 72p.

DEPC, 2020. Vanuatu country assessment report. Implementation of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer. Nov. 2020. Port Vila, Vanuatu. 92p.

Khan, M., Chand, P., Gienko, A., Gennady, T. 2014. Developing a Technique for Categorizing Tropical Cyclone Tracks in the South Pacific. Contemporary Discussions in Mathematics, 137.

Macrotrends, 2022. <https://www.macrotrends.net/countries/VUT/vanuatu/clean-water-access-statistics> Vanuatu Clean Water Access 2000-2022. www.macrotrends.net. Retrieved 2022-06-14.) .

MALFFB, Vanuatu 2021. Department of Agriculture and Rural Development — Background. URL: <https://malffb.gov.vu/index.php?id=1>

Ministry of Climate Change (MOCC). 2020. The Republic of Vanuatu. Third National Communication to the United Nations Framework Convention on Climate Change. Government of the Republic of Vanuatu. Port Vila, Vanuatu. 186p.

Ministry of Climate Change (MOCC). First National Communication of Vanuatu Submitted to UNFCCC <https://unfccc.int/resource/docs/natc/vannc1.pdf>

Ministry of Climate Change (MOCC). Second National Communication of Vanuatu Submitted to UNFCCC https://unfccc.int/sites/default/files/resource/Vanuatu%20NC2_15%20October%202016.pdf

NABCCDRR, 2015. Cyclone Pam post disaster needs assessment. National Advisory Board on Climate Change and Disaster Risk Reduction. URL: <https://www.nab.vu/cyclone-pam-post-disaster-needs-assessment> [accessed 16/05/2019]

Pacific Climate Change Science Program. 2015. Current and future climate of Vanuatu. Vanuatu Meteorology and Geo-Hazard Department. 8p brochure.

Patterson, R. 2020. Questionnaire and reporting requirements on ODS. Department of Environmental Protection & Conservation. Port Vila, Vanuatu. (excel file).

WITS, 2019. World Trade Integrated Solution. World Bank. URL: <https://wits.worldbanki.org>

World Bank Group. 2021. Climate Risk Country Profile: Vanuatu. 28p.

World Risk Report 2016. Focus: Logistics and Infrastructure. United Nations University, Bündnis Entwicklung Hilft, Universität Stuttgart. www.WorldRiskReport.org.

THEME 2:

LAND

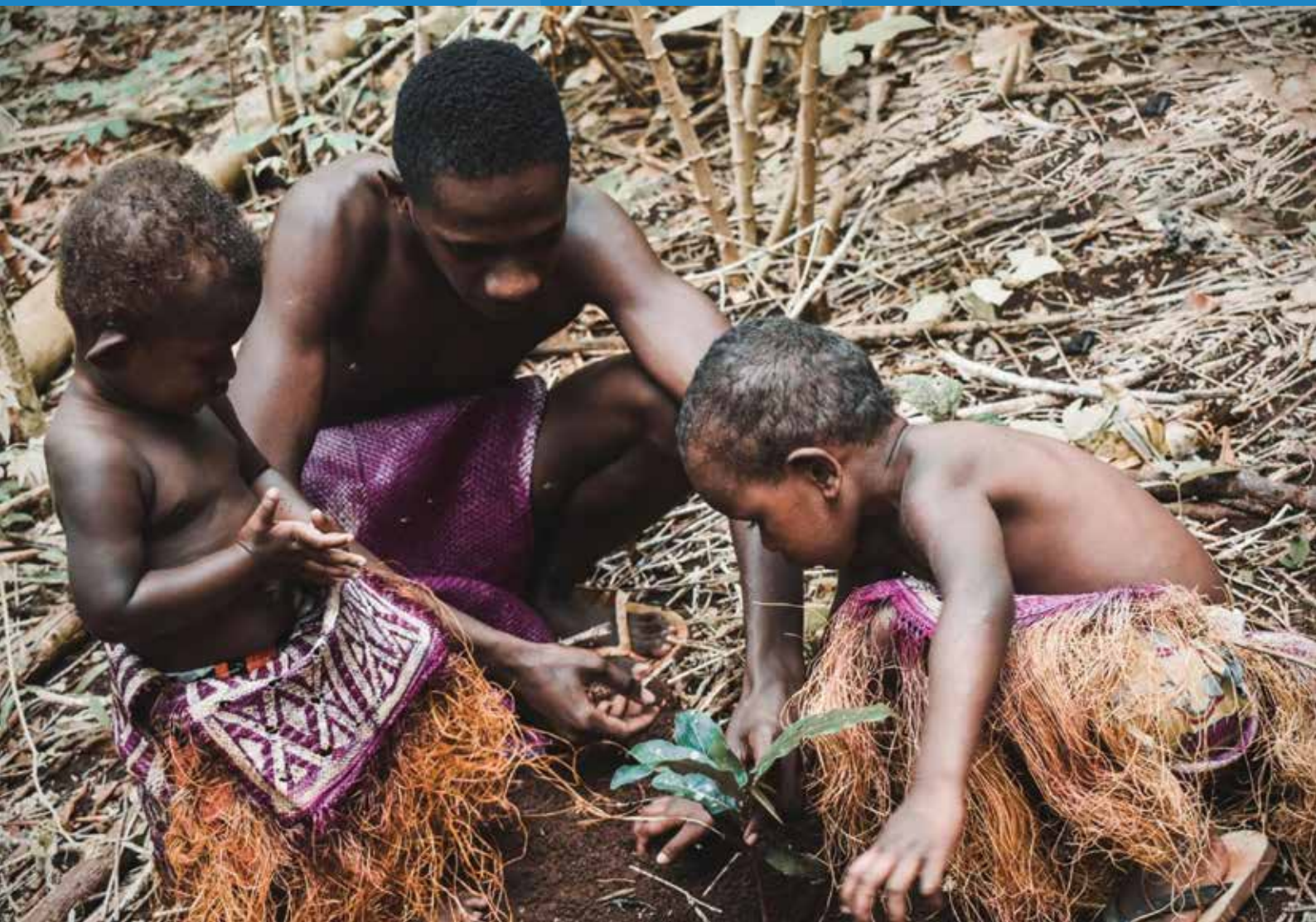


Image source: DEPC

'It is with the land that a ni-Vanuatu defines his identity and it is with land that he maintains his spiritual strength'

Sethy Regenvanu

Land Overview and Highlights

Every person has the following fundamental duties to himself and his descendants and to others to protect the Republic of Vanuatu and to safeguard the national wealth, resources and environment in the interests of the present generation and of future generations

(Art. 7d, Constitution of the Republic of Vanuatu)

This theme focuses on the state of the terrestrial environment and the changes that have taken place since it was settled; the occupation by European settlers, and the modernisation of the nation. Three indicators are used to assess the state of the terrestrial environment. The first is on Land Changes with a particular focus on the vegetation types. The second covers the forests of Vanuatu. The forests provide the resources for communities, habitats for many native and endemic species, and a key part of the water cycle and carbon sequestration. Agriculture is often seen as a threat to the integrity of forests and other natural systems, it is therefore a key part of the terrestrial environment assessment.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Land Changes		Vanuatu's land environment continues to be affected by changes from human activities and natural disasters. Six broad vegetation types are recognised, with forests the largest, followed by thickets and shrublands. Activities and natural disaster events including logging, cattle farming, agriculture expansion, household settlements, infrastructure development, invasive species and cyclones, flooding and storm surges are the main drivers of landscape changes.	Vanuatu has developed its national land use planning policy that focuses on kastom, equity and sustainable development. It has also developed a national geospatial data policy 2020-2030, with the aim of consolidating the coordination of data information for the country. Legislations are enacted by the Ministry of Lands and Natural Resources. Recommendations Provide the resources and build the capacity of national and provincial officers in GIS mapping, compliance and enforcement of Acts, to allow them to execute their responsibilities. Raise awareness and engagement of communities on sustainable living. Continue to manage invasive species and encourage cross-sector collaboration between the Agriculture, Biosecurity, Forestry and the Environment departments.

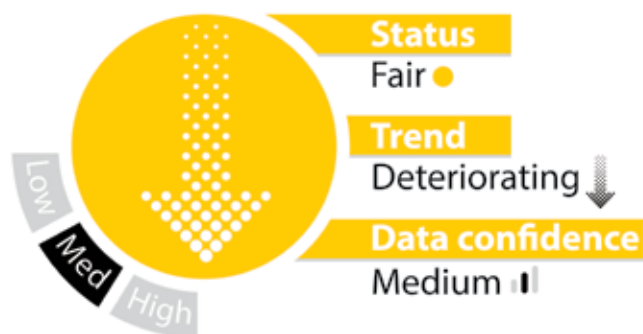
INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Forests		Forests are the most diverse and largest terrestrial habitats in Vanuatu comprising 74% of the land. Eighty per cent of households use forest resources. Primary forests are estimated to cover 36% of land, whereas 40% of commercial forest areas are regarded as degraded. Forests are an important carbon sink for the country. The provinces of Sanma and Malampa have the most forested areas. The main forest loss is taking place on the provinces of Tafea and Penama.	Since the 1990s all commercial logging of forests has been banned. Legislation to empower the ban include the Ban on Log Exports 1993, the Forestry Order No. 9 of 1996 on Control of mobile sawmills, the Forestry Order No. 3 of 1997 on Control of sandalwood export and trade and the Vanuatu Code of Logging Practice (1998). A new forestry policy (2013-2023) includes provisions for protecting high quality forests. Forest inventories are being rolled out. Recommendations Build the capacity of the Department of Forestry staff to assist them with implementing the National Forestry Policy and other conservation strategies. Enhance and empower the connection between formal planning and kastom-based management of forest resources. Promote and engage communities in planting trees, especially those valued for subsistence use, to ease pressure on harvesting from intact forests.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Agriculture		Agriculture generates VUV 3,185 million of export and contributes around 26% to the national revenue. 75% of the population are engaged in agriculture and 80% relies directly on agriculture for their sustenance. The other 20% access agriculture through store and market purchases. There are three categories of agriculture – subsistence, semi-commercial and commercial. Subsistence is the largest and may contribute the biggest impact on land. Semi-commercial involves seasonal planting of cash crops for sale at local markets. Commercial agriculture started with the arrival of Europeans, where large tracts of land were converted into copra plantation and cattle farms. Copra, cocoa, coffee and kava are traditional agricultural products.	Agricultural policies have been developed and implemented including the National Adaptation Programs of Action, and the Agriculture Sector Policy both advocating agriculture as a key component of the nation's response to climate change. Recommendations Engage with research institutions such as USP, VARTC, VAC and VNU to undertake research, share information and adopt technology to allow farmers to use best practice in the agriculture sector. Raise awareness on the importance of the agriculture sector to the economy and in adapting to a changing climate. Build local capacity in research development and assessing the state of agriculture lots.



Image source: DEPC

3.2.1 Land Changes



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 90	National Sustainable Development Policy National Environmental Policy and Implementation Plan Vanuatu Forest Policy 2013-2023 Vanuatu's National Adaptation and Programs of Action National Land Use Planning Policy Vanuatu Agricultural Policy 2015-2030 Vanuatu National Livestock Policy 2015-2030

Indicator definition

Human impacts on the land environment began when the islands were first inhabited. Some of the human pressures, such as exploitation and introduction of invasive species and their consequences including species extinctions, are discussed in the other sections of this SOE report. This indicator focuses on the vegetation types and the evolution to their current state.

Status and Key Findings

The recent geological origin of Vanuatu, compared to neighbouring landmasses of the Solomon Islands, New Caledonia and Papua New Guinea, means that the vegetation is younger therefore the level of speciation is lower. The soil types and conditions and the altitude dictate the vegetation distribution. Vanuatu's vegetation has been variously defined and categorised. Munzinger and others proposed six broad terrestrial vegetation types (Table 8). Forests are the most diverse, with three broad forest categories: Lowland, Seasonal and Montane. According to FAO (2001), the forests (mid-height forest and low forest) make up 36% of the vegetation types, covering approximately 4394 km² land area (Table 9). Thickets and shrub-lands cover a range of plant types and conditions including cleared or degraded forests through to natural vegetation communities. This may include ferns growing on the lava fields of Yasur, or similar plant species growing on other environments (Rhind 2010). This vegetation type covers 4339 km² and is the second highest after forests (Table 9).

Table 8: Vegetation types in Vanuatu. (Munzinger et al. 2006)

ECOSYSTEM
1. Lowland rain forest a. High stature forest on old volcanic soil b. Medium stature forest heavily covered with lianas c. Complex forest scrub densely covered with lianas d. Alluvial and floodplain forest e. Agathis-Calophyllum forest f. Mixed species forest without gymnosperms and Calophyllum
2. Montane cloud forest and related vegetation
3. Seasonal forest, scrub and grassland a. Semi-deciduous transition forest b. Acacia spirorbis forest c. Leucaena thicket, savanna and grassland
4. Vegetation on new volcanic soil
5. Coastal vegetation including mangroves
6. Secondary and cultivated woody vegetation

Table 9: Vegetation cover of Vanuatu. (FAO 2001)

VEGETATION TYPE	Area km ²	Land Area (%)
Mid-height forest (20-30m)	2053	17
Low forest (10-20m)	2341	19
Woodland (<10m)	4	0.03
Thickets (3-8m)	4339	35
Scrub (<3m)	450	4
Grassland	511	4
Swamp communities	23	0.19
Mangroves	25	0.20
Bare ground/human made	2523	21
Total land area	12,269	100

At the national level, Table 8 lists the main vegetation types that have been recognised in Vanuatu. The vegetation types listed in Table 11 includes non-terrestrial environments. These are assessed elsewhere (Theme 3 and Theme 4). However, the only national mapping available for terrestrial ecosystems was a vegetation map published by the Vanuatu Forestry Department (Schwetter 2012).

Table 10: Ecosystem types and the total area for Vanuatu. (Mackey et al. 2017)

ECOSYSTEM	Area (ha)	Percentage of national land area (%)
Bare soil	7,687	0.65
Grassland	39,776	3.37
Tropical Forest - Low	305,509	25.87
Tropical Forest - Medium	254,550	21.55
Tropical Forest - Shrubs	30,886	2.61
Tropical Forest - Thickets	343,886	29.11
Coastal - Seagrass	124,038	10.50
Coastal - Mangroves	1,665	0.14
Coastal - Coral	70,238	5.95
Freshwater - Wetlands	406	0.03
Freshwater - Waterbodies	539	0.05
Unknown	1,961	0.17
Total	1,259,188	100

Assessment by Mackey et al. (2017) shows Vanuatu's vegetation has been heavily modified with 65% of grassland being affected, 63% of the medium forest and 24% of low forest (Table 11).

Table 11: Ecosystem conditions in Vanuatu. (Mackey et al. 2017)

ECOSYSTEM	Intact (ha)	Modified (ha)	Total (ha)
Grassland	14057	25719	39776
Low Forest	231408	74102	305510
Medium Forest	94576	159974	254550
Shrubs	30886		30886
Thickets	343886		343886

Threats to Vanuatu's vegetation

There are many factors contributing to the changes in Vanuatu's vegetation. The clearing of many forest areas for cattle farming has resulted in extensive grassland. In other places such as Efate, the original vegetation that is accessible has changed to other land uses, and with the current population pressure the remaining interior forests are slowly disappearing (Viranamangga 2010). In the eastern and southern parts of Santo, most of the forests have been converted to various land uses. The mid-height open forest on the East of Santo has been heavily logged since the early 1960s and because it is an open forest the areas are covered by *Merremia peltata* and pioneer trees species and shrubs such as *Macaranga*, *Hibiscus tiliaceus*, and *Trema orientalis*. These areas are slowly converted in shifting cultivation, cattle grazing, commercial agriculture and forest plantation and woodlot.

Much of the coastal and lowland forest areas have been cleared for settlement, and subsistence and commercial agriculture, especially during the 20th Century. Logging of lowland and foothill forests, particularly for hardwood species such as kauri and sandalwood, is widespread and ongoing. Logging roads provide access into native forests by invasive rats, feral cats, feral pigs, feral dogs, Mynah birds, and the

invasive vines *Merremia* and *Mikania*. The introduction of the invasive ant *Wasmannia* from the Neotropics is causing great ecological damage in degraded areas and in the margins of native forests. Introduced African snails are also affecting native species. Hunting of fruit bats is reducing their populations, and affecting the pollination and distribution of forest tree species.

Climate change is another existential threat to communities and the environment. The effect of climate change on weather patterns and projections for more severe and intense tropical cyclones, threaten communities and the environment. Category 5 Cyclone Pam hit Vanuatu in 2015 causing infrastructural damage as well as claiming 11 lives. The effect on the vegetation was so severe, that it stripped foliage of most of the forests and large garden trees, leaving a barren look for the whole of the country over the following weeks and months (Figure 30). Vanuatu's vegetation, barely recovered from Pam, was again affected by category 5 cyclone Harold. Cyclone Harold's main path was to the southern parts of Santo and directly over Pentecost Island. The devastation was severe including defoliation, landslides and high sediment loading in the coastal environment (Figure 31), (Scheip and Wegmann 2021).



Figure 30: The aftermath of Cyclone Pam, where most of the tree foliage has been stripped bare. (CC BY-NC-ND 2.0)



Figure 31: Vegetation damage following cyclone Harold (in red highlight). (www.hazmapper.org)

On most islands the villages located on the coast are now surrounded by coconut plantations and cattle farms, forcing people to walk for hours from their home to their gardens located on the deep and good soils on uplifted plateaus. With the growing population, the pressure on land next to villages is increasing. Absence of roads giving access to new land is therefore a serious constraint to cultivation. The vegetation type of coconut plantations is by far the most important perennial crop in Vanuatu. These plantations represent a significant constraint to shifting cultivation

In areas which are heavily populated or where so many coconuts have been planted, there is now not enough land for shifting cultivation and food crop production.

Impact

Vanuatu's terrestrial environment continues to be affected by human settlement and infrastructure developments, invasive species and natural disasters being exacerbated by climate change. The demand on nature and resources to meet the

needs of an increasing population will no doubt contribute to a changing landscape. Agriculture and other forms of farming will encroach on forested and re-forested areas, and the demand for resources may lead to logging and timber processing with local and international markets.

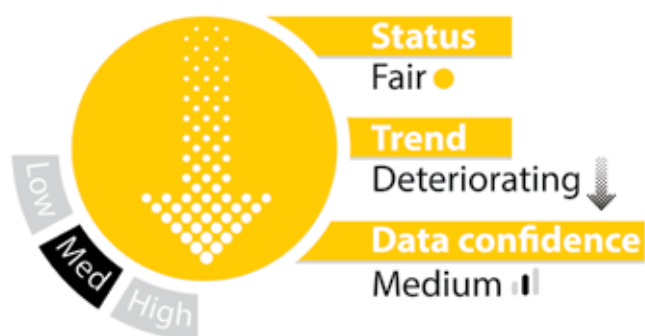
Response

Vanuatu has developed its national land use planning policy that focuses on kastom, equity and sustainable development. It has also developed a national geospatial data policy 2020-2030, with the aim of consolidating the coordination of data information for the country. A total of 10 legislations are enacted by the Ministry of Lands and Natural Resources, and another 10 amendment Acts are in place. Conservation areas have been established in some parts of the islands including Efate Forest Conservation Area (ELMA), Pankumo Protected Area, Kauri Reserve of Erromango, Vathe Conservation Area in Santo, and Western Peninsular Forest Conservation Area, covering around 4% of the land area.

Recommendations

- Enacting and enforcing legislation to ensure that all developments meet the proper environmental assessment requirements, and those developers and proponents adhere to conditions of their permits.
- Raise the awareness and engagement of communities on sustainable agriculture and being conscious of the environment and the need for protection.
- Build the capacity of staff at national and provincial levels to undertake assessments and implement policies and legislation.
- Secure resources to allow the staff to undertake and execute their responsibilities.
- Continue to manage invasive species and encourage cross-sector collaboration between the Agriculture, Biosecurity, Forestry and the Environment departments.

3.2.2 Forests



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 46, 59, 63 (a) 94 (a-f)	National Sustainable Development Policy National Environmental Policy and Implementation Plan Vanuatu Forest Policy 2013-2023 Vanuatu's National Adaptation and Programs of Action Vanuatu National Strategy for the Development of Statistics

Indicator definition

Primary forests are among the most biodiverse forests, providing a multitude of ecosystem services, making them crucial to monitor for national land use planning and carbon accounting (University of Maryland and World Resources Institute 2022). The definition of Vanuatu forests includes land spanning more than 0.5 ha, with trees higher than 5 m and a canopy cover of more than 10%. It further includes agroforestry, fruit plantations and silvopastoral systems, mangroves, bamboos and palms that fit the height and canopy cover, forest roads, firebreaks and other small open areas, national parks, nature reserves and other protected areas. The indicator assesses the current state of Vanuatu's forests and the main threats, and changes over time.

Status and Key Findings

Vanuatu's forests have been subjected to a long history of human use. Forests have always been an integral part of lives of the people of Vanuatu and contribute to the welfare and economic development. It is the most important ecosystem resource category with over 80% of all the communities using the forest. A forest inventory was conducted from 1990 to 1993 and concluded that 74% of the land was made up of different forest types (e.g., closed forests, scrubs and thickets) (Baldwin et al. 1993). Of this forested cover, only 10% was primary forest; 36% classified as production forest, but only 20% of the production forest was of commercial use (Tate 2008). An update of Vanuatu's ecosystem types found the forest to be the largest comprising 66% of the total land. Of this 66%, 18% were low forest, 18% medium forest, 24% thickets and 2% shrubs. The state of Vanuatu's ecosystems could not be determined due to insufficient data but based on published accounts, the intact state may be over-estimated and that shrubs and thickets may be more abundant in a modified state (Mackey et al. 2017).

The challenge for commercial use was due to inaccessibility, low tree density, cultural reasons, or because it has already been heavily logged during the eighties and nineties.

In the mid-2000s, natural forest cover in Vanuatu was estimated at 4440 km², equivalent to 36% of the total land area (12,200 km²) (FAO 2010), and at least 40% of the commercial forest area was regarded as degraded (King 2007). The provinces of Sanma and Malampa had the most tree cover of all the provinces (Figure 32).

LOCATION OF FOREST IN VANUATU

In Vanuatu as of 2010, the top two regions represent 58% of all tree cover. Sanma had the most tree cover at 406 kha compared to an average of 191 kha.

1. Samma (406 kha)
2. Malampa (263 kha)
3. Tafea (144 kha)
4. Shefa (139 kha)
5. Penama (115 kha)
6. Torba (80.6 kha)

Source: <https://rb.gy/w0qas>



Figure 32: Forest in Vanuatu.
(CC BY-NC) © martyhing.

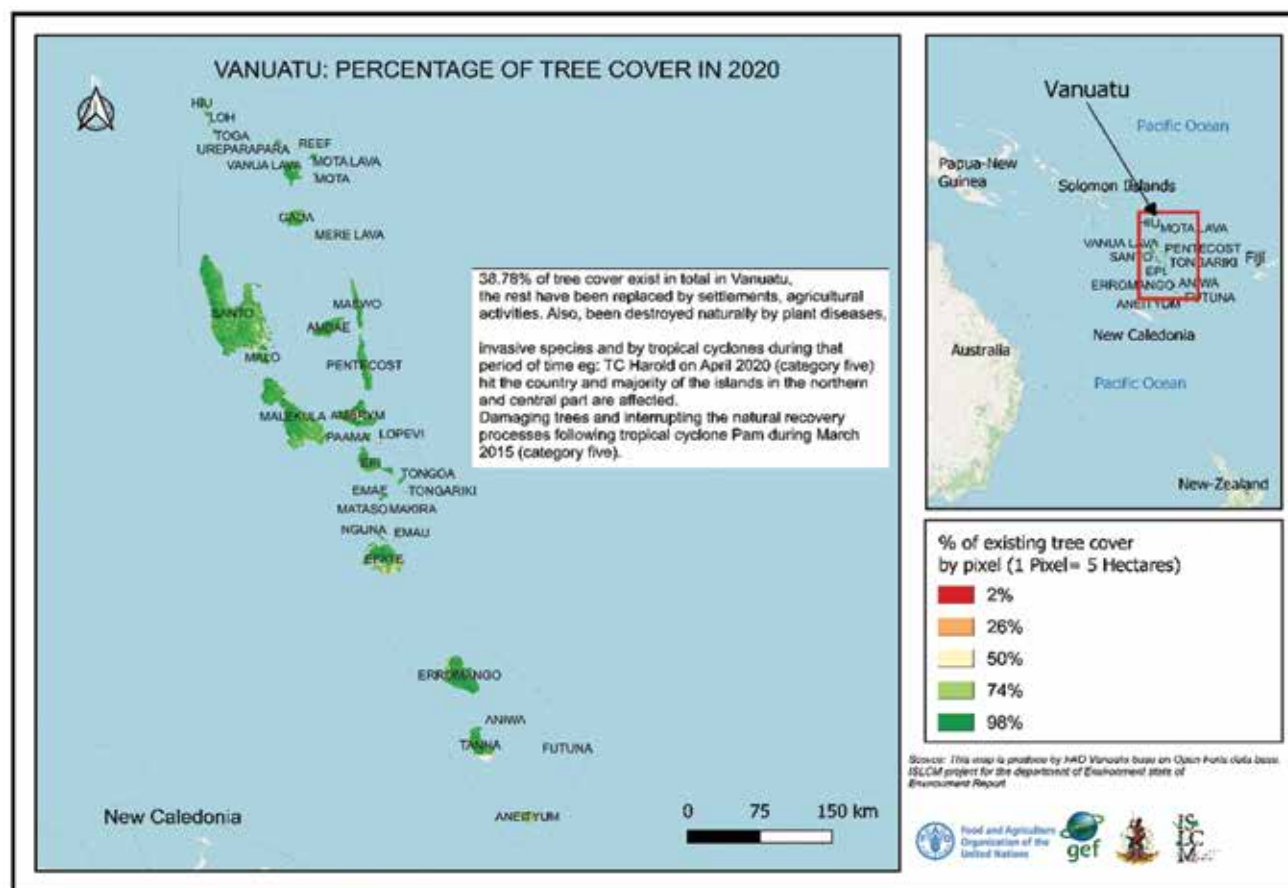


Figure 33: Tree cover in Vanuatu. (Seurv Cevuard Riddick (FAO-ISLCM Project))

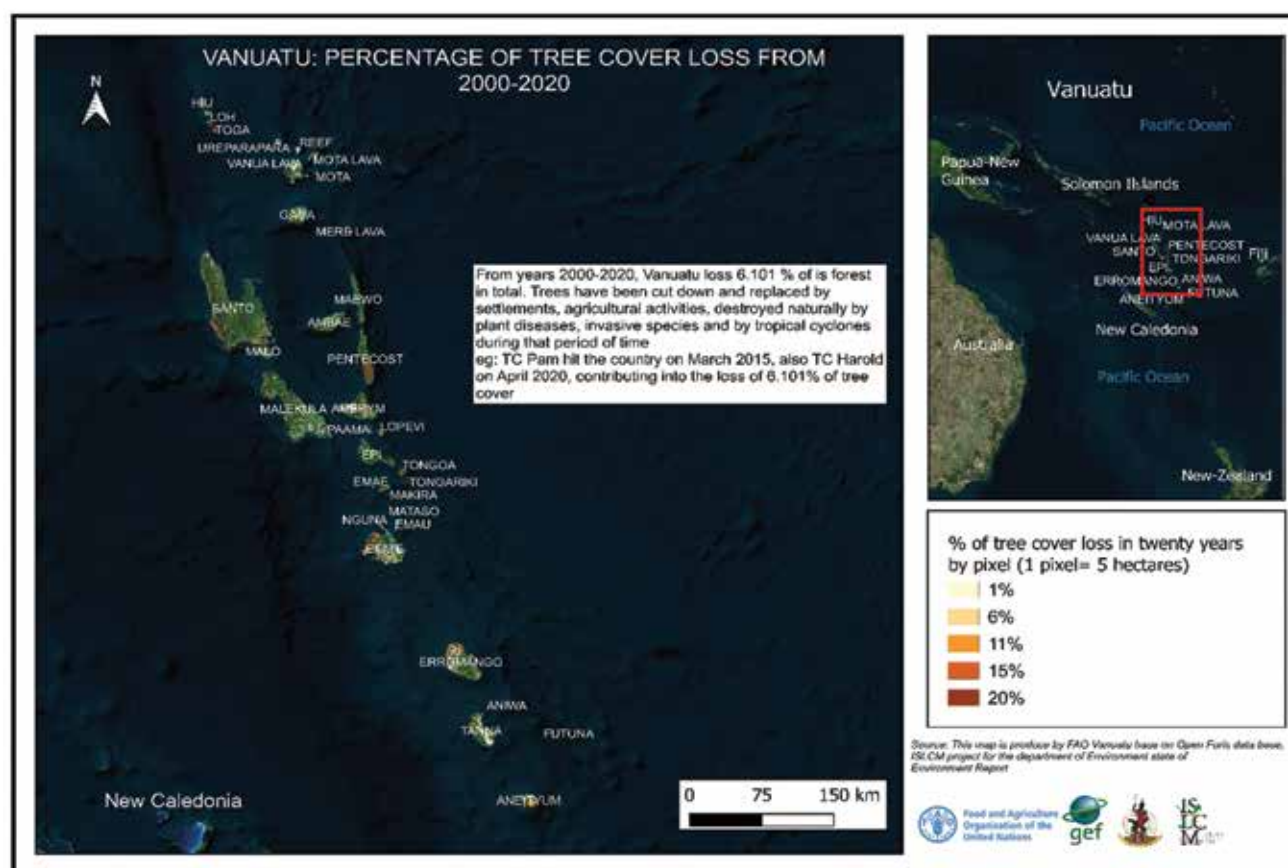


Figure 34: Percentage of tree cover loss in Vanuatu. (Seurv Cevuard Riddick FAO-ISLCM Project)

From 2002 to 2021, Vanuatu lost 54.8 km² of humid primary forest, making up 34% of its total tree cover loss in the same period (Figure 35). The loss is equated to 9.73 Mt of CO₂ emissions (Figure 36) (www.globalforestwatch.org). The loss is attributed to shifting agriculture and urbanisation (www.globalforestwatch.org). Total area of humid primary forest in Vanuatu decreased by 1.5% in this time period (www.globalforestwatch.org). Vanuatu’s 2007 Census estimated 1530.1 km² has been lost over a 20-year period.

From **2002 to 2021, Vanuatu lost 5.48kha of humid primary forest**, making up **34%** of its total tree cover loss in the same time period. **Total area of humid primary forest in Vanuatu decreased by 1.5%** in this time period.

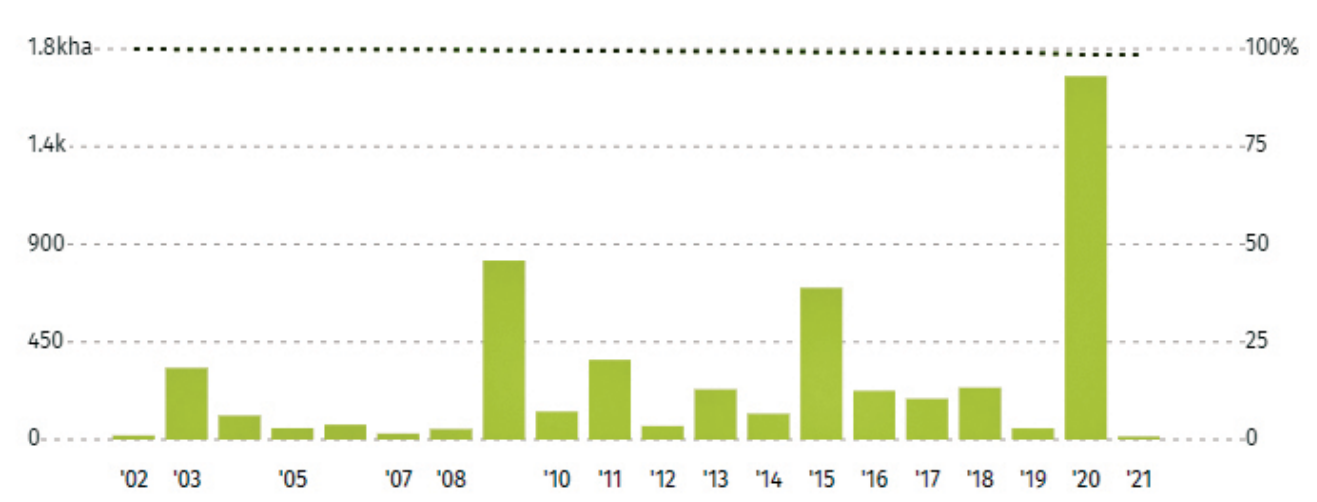


Figure 35: Primary forest loss in Vanuatu from 2002 to 2020. (www.globalforestwatch.org)

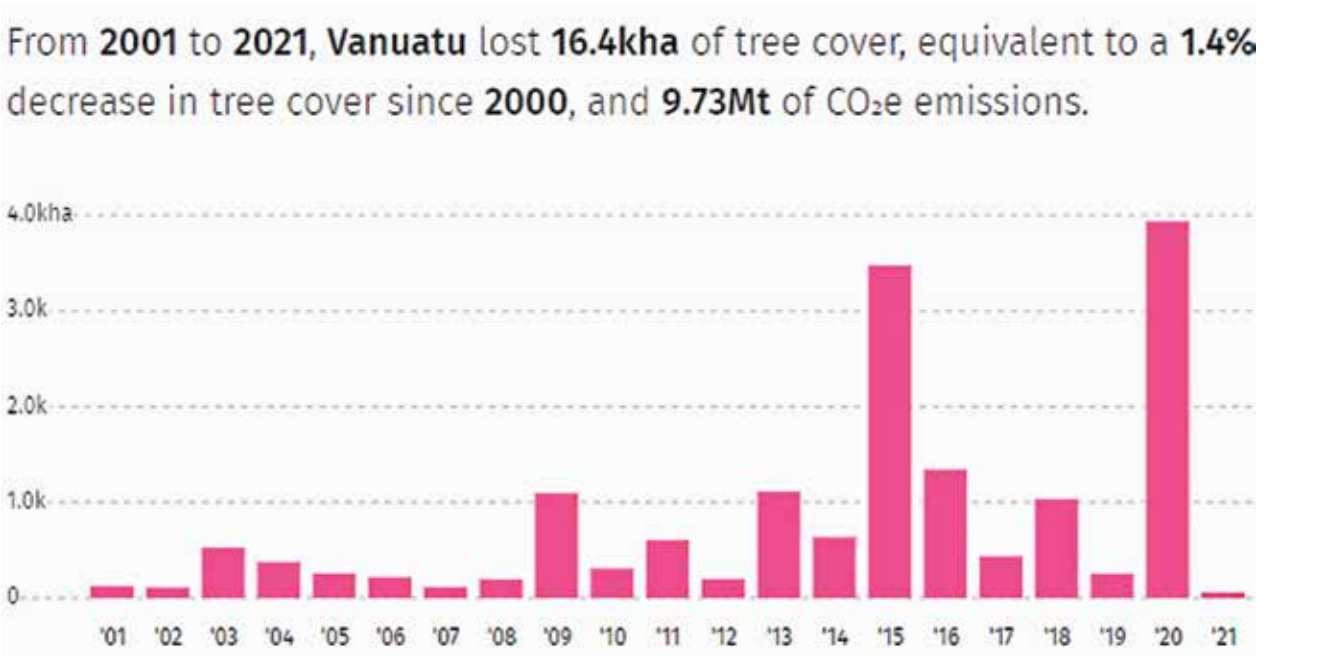


Figure 36: Vanuatu’s tree cover loss from 2001 to 2021, releasing 9.73Mt of CO₂ emissions. (www.globalforestwatch.org)

Most of the high value forests were exploited in the 1980s and 1990s. This led to a ban in large scale logging in the late 1990s. Vanuatu is using more forests than is being planted and some of the customary landowners are developing their logged forest areas into commercial agriculture, or into real estate development in places such as Efate and east Santo. Subsistence farming and some commercial logging are key threats to forest loss (Mackey et al. 2017). Severe cyclones affect the forests through blowdowns and landslips. The invasive vine *Merremia*, which impedes the natural regeneration of the logged forest, has invaded large forest areas and abandoned agricultural land.

The total tree cover loss for the country was 164.1 km², or a decrease of 1.4% since 2000 (Table 12). This is less than 0.1% of the global total (www.globalforestwatch.org). From 2001 to 2021, there were some small gains in tree cover with Sanma's tree cover growth by 4.67 km², followed by Tafea at 3.55 km² (Table 13). Some deforestation activities continue to be detected via the use of satellites with the highest in Sanma (5 ha) and Shefa (1 ha) (www.globalforestwatch.org).

Table 12: Tree cover loss per province from 2001 to 2021. (www.globalforestwatch.org)

PROVINCE	Tree cover loss (km ²)
Tafea	46.9
Penama	30.4
Shefa	28.4
Sanma	27.2
Malampa	19.3
Torba	11.9
Total loss	164.1

Table 13: Tree cover gain per province from 2001 to 2021. (www.globalforestwatch.org)

PROVINCE	Tree cover gain (km ²)
Sanma	4.67
Tafea	3.55
Malampa	2.47
Shefa	1.23
Torba	1.10
Penama	0.65
Total gain	13.67

The latest forest inventory by the Department of Forestry found significant forest loss in many of the islands, with Santo, Efate, Tanna and Malekula losing thousands of hectares in 2018 (Table 14) (DoF Forest Inventory Data 2021).

Table 14: The latest Vanuatu forest inventory showing loss and growth for the year 2018. (DoF – Forest Inventory Data 2021)

ISLAND	2018 Forest Loss ha (km ²)	Total Forest Growth ha (km ²)
Aneityum	241.6 (2.41)	483.1 (4.83)
Ambae	457.4 (4.57)	-
Efate	4951.4 (49.51)	107.9 (1.08)
Epi	1693.4 (1.69)	-
Santo	7367.1 (73.67)	940.5 (9.41)
Gaua	619.2 (6.19)	-
Maewo	269.8 (2.70)	-
Malekula	3792.7 (37.93)	107.9 (1.08)
Pentecost	1128.1 (11.28)	-
Tanna	4594.6 (45.95)	
TOTAL	25115.3 (251.15)	1639.4 (16.39)

Impact

Forests provide a key habitat for many of the key endemic and native species in Vanuatu. Their ecological importance is vital to the wellbeing of all Vanuatu. The carbon sequestration capacity of Vanuatu's forest ensures that its CO₂ emissions remain carbon negative. The forests continue to provide the resources to support rural communities, and revenues for the nation. The threats to forests will continue to increase with increasing population and increasing global warming. With the population increase, many of the forests will be used for subsistence gardening and semi-commercial agriculture. Some areas will be developed for settlement, or expansion for urban use. The severity of weather patterns may induce more severe cyclones passing through Vanuatu, and causing destruction to the country's forests and infrastructures. Defoliation, which is an after-effect of cyclones, opens up areas where logging with portable sawmills can take place (Mackey 2017). Landslides may be one of the consequences from these cyclones, as well as inundation of low-lying forested areas by waves. Droughts could also contribute to the degradation of forests sites, as well as volcanic activities and the resulting ashfall and acid rain.

Response

The Vanuatu forestry industry is fairly small, with few foreign companies undertaking logging operations and relatively low quantities of timber exported out of the country. The majority of companies in the forestry sector are locally owned and small to medium scale operations. There is also a national focus on developing plantations to supply the domestic timber needs and transition away from logging in native forests, and on local processing of timber, with an export ban on unprocessed logs and slabs that has been in force for many years. The forestry sector is well regulated and managed compared to elsewhere in the region. However, there are still some operators that are not following the law.

Vanuatu's forest loss is considered low compared to neighbouring countries (e.g. PNG and the Solomon Islands). The heavy exploitation of the forests from the 1980s-1990s by foreign companies has resulted in the degraded state of commercially exploitable forests. The Government enacted legislation and a ban was put in place to manage logging and export operations. Legislation includes: Ban on Log Exports (1993); the Forestry Order No. 9 of 1996 on Control of Mobile

Sawmills; the Forestry Order No. 3 of 1997 on Control of Sandalwood Export and Trade; the Vanuatu Code of Logging Practice (1998), and the National Sandalwood Policy 2003. Today, valuable timber resources have been largely depleted (Glencross and Viranamanga, 2012) and there are no longer any forestry concessions operating in the country.

The Forestry Act (Cap 276) includes sustainable forestry practices and conservation of important biodiversity areas. Conservation can be established in forested areas where there are scientific, cultural, social interests, or other special values for the community now and in the future. Customary landowners are encouraged to declare conservation areas under the Act.

Policies such as the Vanuatu Forestry Policy 2013-2023 provide for protecting high quality forest areas in the country. National forest inventories are being carried out throughout the country to provide an up-to-date status on forestry resources.

With climate change high on the global agenda, efforts to carry out research on the role of forests in mitigating climate change is encouraged. In addition, the effect of climate change on forests and other ecological systems and resources of Vanuatu is a high priority. Regional and international partners are responding to this priority by working with various departments to undertake research and projects such as the Pacific Ecosystem-Based Adaptation to Climate Change Project (PEBACC) focussed on strengthening the role of natural ecosystem services to enhance resilience to climate change. Another important collaboration is between the Department of Forestry and the New York Botanical Garden in understanding the flora of the country, which includes building local capacity in botany and curation of herbarium specimens.

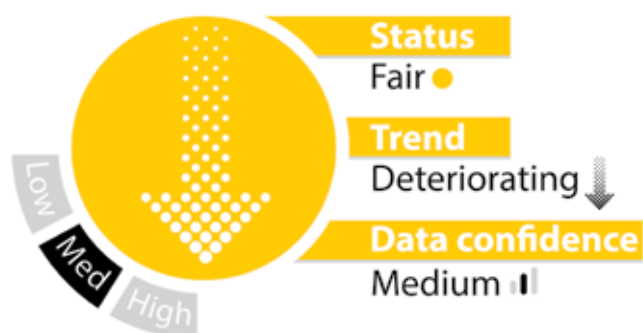
Another important initiative that has been going on for many decades is the nursery and the provision of important timber and other useful tree species to communities as part of restoration and conservation efforts. Some of the key species include those that are high value timber species such as sandalwood, mahogany, whitewood, Nanagai and Natapoa.

A Forest and Landscape Restoration Strategy is being developed by the Department of Forestry with assistance from the Food and Agriculture Organisation (MALFFB 2020).

Recommendations

- Vanuatu's forests will benefit from an ecosystem-based approach, which is advocated in many of the national policies. The challenge is the limited resources and the capacity available to implement it at the provincial and local community levels.
- There is further need for capacity development focusing on the connection between formal planning and kastom-based management.
- Continue to promote the planting of trees and encourage adopting sustainable practices and living around forest areas.

3.2.3 Agriculture



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 59, 63 (a, f)	National Sustainable Development Policy National Environmental Policy and Implementation Plan Vanuatu Agricultural Sector Policy 2015-2030 National Adaptation Programs of Action National Land Use Planning Policy Vanuatu National Strategy for the Development of Statistics

Indicator definition

The indicator assesses the state of agriculture in Vanuatu and its impact to the environment.

Status and Key Findings

Agriculture generates VUV 3,185 million (USD35 million) of exports; a contribution of around 26% to the national income. The agriculture sector makes up 75% of the country's primary sector contributions to the 2012 GDP (Figure 37). A high proportion of the population (over 75%) are involved in agriculture, whereas 80% of the population depends entirely on agriculture for their daily sustenance (Agriculture Policy). Although the other 20% reside in the urban areas, most would still rely on agricultural products from market centres for their daily source of nutrients. Key agricultural commodities that are exported include coconut products, kava, beef and cocoa. The production of agricultural and horticultural products outside of the main commodities is primarily for the domestic market, although increasingly spices, coffee and some semi-processed products (canarium nut, tamarind, tamanu oil) are exported (PHAMA 2019).

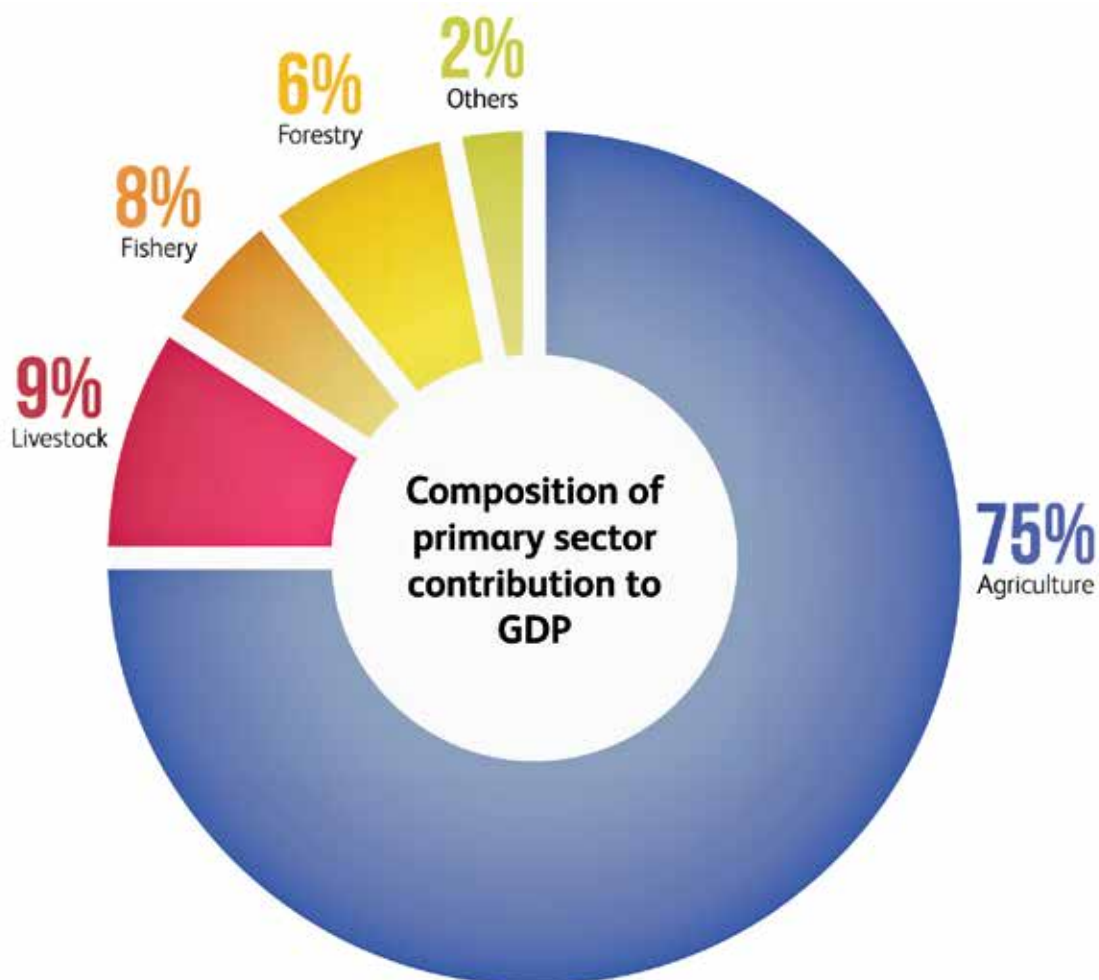


Figure 37: Vanuatu's key sectors contribution to the GDP in 2012. (Reserve Bank of Vanuatu, cited in Agriculture Policy)

Vanuatu's agriculture can be classified into three key types:

- I. Subsistence agriculture revolves around crop gardens with some households keeping cattle and other livestock. The main purpose is providing food for home consumption, however, when there is excess of crops, they are sold at local markets (Nelson 2015). Main crops are root (taro, yam, cassava and sweet potatoes). This group is the largest representing more than 75% of the total agriculture sector.
- II. Artisanal (semi-commercial) agriculture provides income to rural households, although most of the activities are centred near urban centres, where there is high demand for the population and the tourism industry. Most rural households have coconut sub-holdings, and many are expanding to kava, cocoa and other cash crops. Popular crops are Chinese cabbages, tomatoes, capsicum, and eggplants. The number of cattle being owned by sub-holders is increasing. These are often households that grow vegetables to sell and for home consumption. This group comprises of around 15% of the agriculture sector.
- III. Commercial agriculture or farms began with the arrival of European traders. Large fertile areas were planted with coconuts, cocoa, coffee and other products (Figure 38). When Vanuatu became independent, all land was returned to the customary owners, with some being leased back to plantation managers if they wish to continue their agricultural operations. Significant shifts in the commercial agriculture operations, given that many of the original coconuts, copra and coffee are at the end of their productive life. Some of these farms have been converted to cattle or other livestock farms. Due to issues with customary landownership, most of the commercial agriculture is now concentrated on the islands of Santo, Malekula, Epi and Efate. Main crops are cocoa (24%), kava (50%) coffee (2%) and coconuts (69%) (Figure 38). This group comprises of around 10% of the agriculture sector.

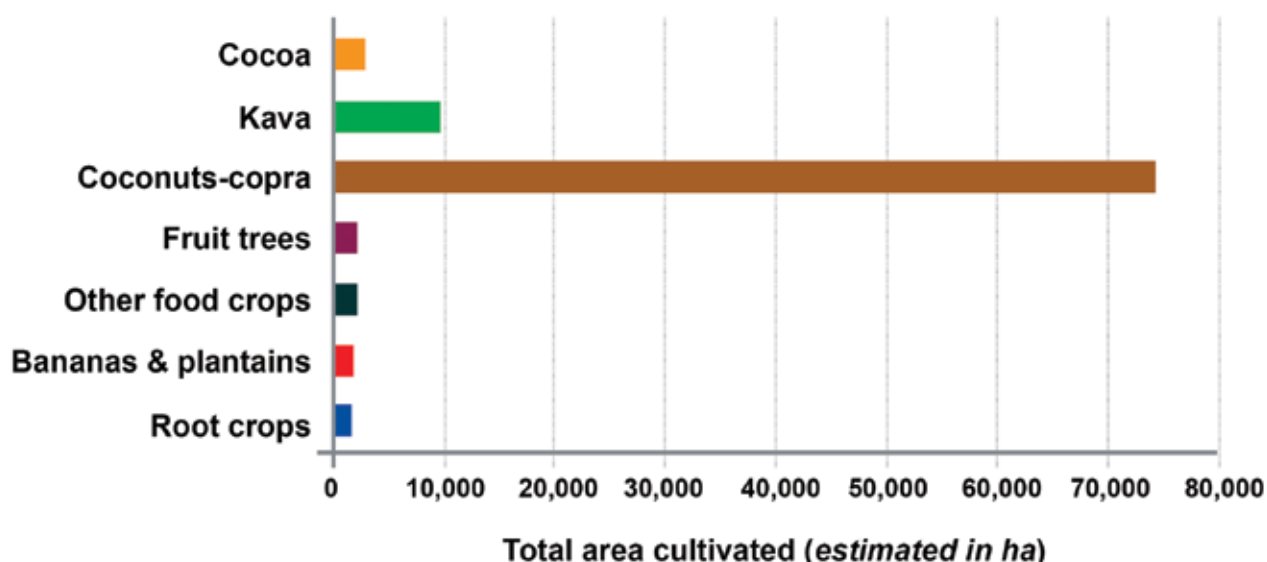


Figure 38: The variety of crops and the approximately size of the farms. (DEPC).

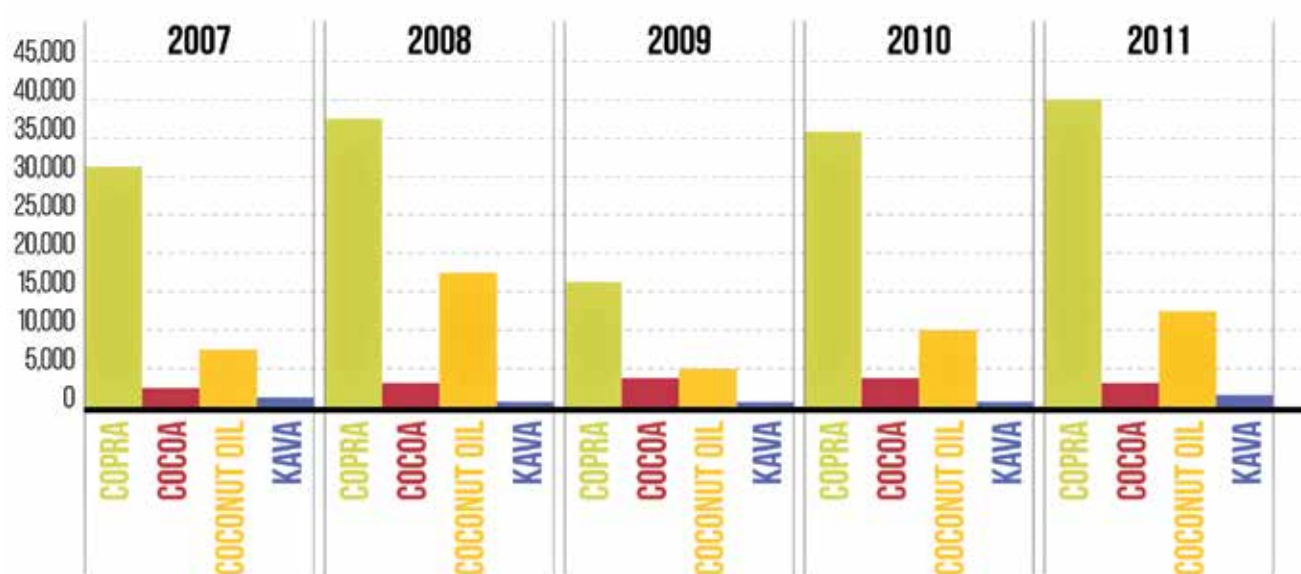


Figure 39: The four main cash crops grown in Vanuatu from 2007 to 2011. (Vanuatu National Statistics Office, cited in Ag Policy)

Vanuatu's total land area is 12232 km², of which only 4922 km² is good agricultural land representing only 40% of the total area or 26 acres per household. More than 90% of the land is customarily held land while about 10% is Government owned or leased land on which there is an opportunity for strategically increasing production. Nonetheless, only one third of the cultivable customary land area is presently being farmed according to the Agriculture Policy.

Climate change is expected to have an adverse effect on the sector. With temperatures increasing, seasonal rainfall

patterns shifting, and extreme events more frequent and severe. The incidence of heat, water, pest/disease and soil fertility stress are drastically hampering already risk prone production. Cyclone Pam devastated agriculture in 2015. With wind speeds of up to 320 kilometres per hour, the Category 5 cyclone was one of the worst to make landfall in Vanuatu. An estimated 90% of subsistence crops were destroyed, along with 50% of shelters in Tanna Island. The country's total value of economic loss was estimated to be as high as 50% of the annual GDP (Wong 2019).

Impact

The limited arable land available for agriculture means that care must be at the forefront of any large-scale operations or developments. Fortunately, the majority of agriculture operations are for subsistence and therefore many of the participants use rudimentary tools, rely on rain irrigation and use organic farming practices. These have small impacts on the environment when compared with large scale operations involving heavy machinery and intensive operations. Commercial intention in agriculture can often lead to deforestation. Some farming practices such as slash-and-burn land clearing have shown to have negative impacts on the environment including soil erosion.

Response

Vanuatu Policies:

- Vanuatu's National Adaptation Programs of Action (NAPA) identifies four priority sector areas: agriculture and food security; sustainable tourism development; community based marine resource management; and the sustainable management of forest.
- Vanuatu Agriculture Sector Policy 2015-2030. The Agriculture Sector Policy provides the framework on issues such as agriculture land use, rehabilitating agricultural land for food security and on environmental protection and sustainable farming. Buffer zones and wildlife corridors are some of the considerations under the environmental protection and sustainable farming theme.

Recommendations

- Advocate for more agricultural research to improve knowledge, information and technology available to farmers.
- Encourage sustainable farming practices and alternatives to the use of slash-and-burn farming technique.
- Raise awareness on the importance of the agriculture sector towards food security and national income.
- Build the capacity of the Agricultural sector in data collection, storage, analysis and reporting.
- Provide assistance to farmers in farming sustainable practises.

Land References

- Baldwin, P., Hidson, J., et al. 1993. Forest resources of Vanuatu. A summary of the forest resources of Vanuatu derived from the National Forest Inventory. Brisbane, Queensland Department of Primary Industries: 196p. - <https://www.globalforestwatch.org/dashboards/country/VUT>
- Department of Forestry, 2000. Vanuatu Country Report. Heads of Forestry Meeting, Nadi Fiji 8-12 May, 2000. Port Vila, Vanuatu. 21p.
- Glencross, K., & Viranamangga, R. 2012. Silviculture of Whitewood (*Endospermum medullosum*) in Vanuatu. Australian Centre for International Agricultural Research (ACIAR) 2012.
- Mackey, B., Ware, D., Nalau, J., Sahin, O., Fleming, CM., Smart, JCR., Connolly, R., Hallgren, W., & Buckwell, A. 2017. Vanuatu – Ecosystem and socio-economic resilience analysis and mapping. SPREP. Apia. Samoa. 96p.
- Mc Evoy, D., Komugabe-Dixson, A., Trundle, A. 2017. Greater Port Vila. Social Mapping and Analysis of Ecosystem Use. Apia, Samoa. SPREP. 90p.
- Mc Farlane, D., & Shelton, M. 1986. Pastures in Vanuatu. ACIAR Technical Report 2. Pp. 26-27
- Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, 2021. Annual Report 2020. Government of Vanuatu. Port Vila, Vanuatu. 87 p.
- PHAMA, ND. Quality the key to Vanuatu export success. Pacific Horticultural & Agricultural Market Access Program.
- Scheip, CM., & Wegmann, KW. 2021. HazMapper: a global open-source natural hazard mapping application in Google Earth Engine, Nat. Hazards Earth Syst. Sci., 21, 1495–1511, <https://doi.org/10.5194/nhess-21-1495-2021>, 2021.
- Siméoni, P., & Lebot, V. 2012. Spatial representation of land use and population density: Integrated layers of data contribute to environmental planning in Vanuatu. Human Ecology. 37 (2): 1-16.
- Viranamangga, R. 2010. Implementation phase. Phase II Final Report. January 2010 to July 2010. Ministry of Agriculture, Quarantine, Forestry and Fisheries. MAR-SFM Project – Vanuatu. Government of Vanuatu. 1-14.
- Wong, C. 2019. Going Organic: From farm-to-fork in Vanuatu. Online article. www.sdgfund.org (accessed 20/06/2022).

THEME 3:

MARINE and COAST



Image source: DEPC

Marine and Coast Overview and Highlights

Vanuatu's maritime jurisdiction comprises 98% of the nation and includes living and non-living marine resources that contribute significantly to the country's economy and food security, and are fundamental to the wellbeing and identity of its citizens. Limited land resources and the dispersed and isolated nature of communities make the Ni-Vanuatu people heavily reliant upon the benefits of marine ecosystems.

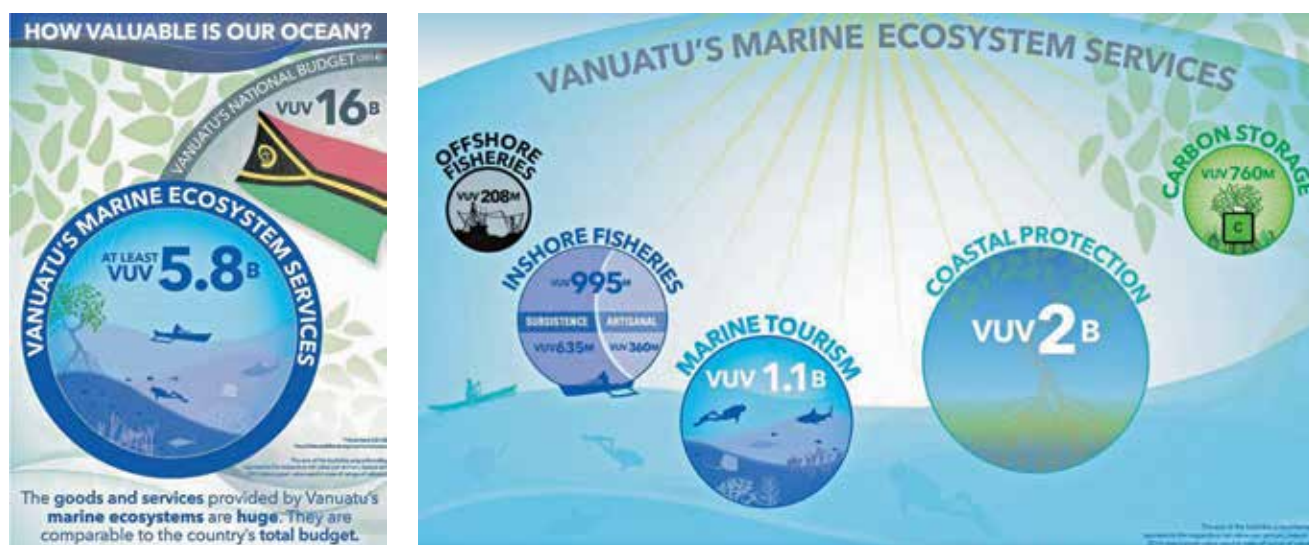
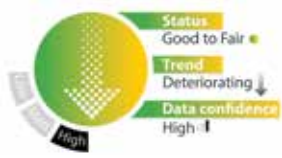
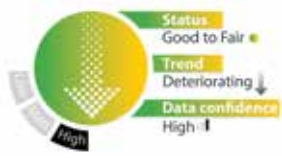
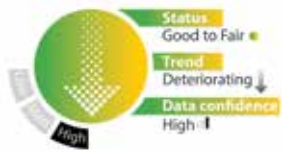
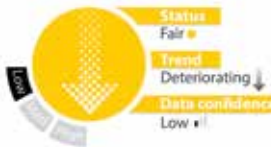


Figure 40: Goods and services from Vanuatu's marine and coastal ecosystems. (MACBIO 2019)

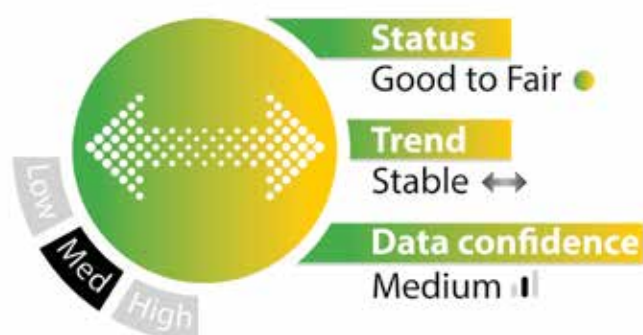
INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Coral Reefs		Most of the islands of Vanuatu are encircled by discontinuous fringing reefs, but there is a small atoll formation north of Efaté and a few barrier reefs within the island chain. The shallow reefs are dominated by coralline algae, plate corals and branching forms. Below about 5 m, massive and branching corals dominate. Marine biodiversity is high on the reefs of Vanuatu, with more than 500 fish species and 295 hard corals already recorded. Live coral cover varies widely throughout these islands due to the frequency of cyclones, along with the unusual level of seismic activity and occasional infestations of crown-of-thorns starfish	Conservation areas provide the best opportunity for coral reefs and resources to be safeguarded. Marine spatial planning provides information to allow for establishing a network of marine protected areas in the inshore and offshore areas. Legislation is in place to provide support for reef conservation. Recommendations Continue to monitor the health of the coral reefs and use the results to make informed decisions. Secure resources to support staff and communities to monitor coral reef health. Implement the outcomes of the marine spatial planning, specifically the establishment of network of marine conservation areas.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Fisheries	Subsistence fishery 	Worth over USD10 million annually, this is one of the most important fisheries in the country. Most of the households rely on subsistence fishing for sustenance. Gender roles are important, with men fishing mostly offshore and remote places, whereas women undertake coastal fishing.	The sector is overseen and managed by the Department of Fisheries. The Fisheries Act provides the legal framework for the management of the sector. The Vanuatu Fisheries Sector Policy and the National Roadmap for the Coastal Fisheries provide guidance on resource management, to enable sustainability of the sector, as well as generating revenues for the economy. Other important policies to consider include the Marine Spatial Planning (to be completed), the National Ocean Policy, and the Specially and Unique Marine Areas that have been identified under the MACBIO project. Recommendations It is important that national policies and plans are implemented expeditiously and effectively. This necessitates the securing of the resources including financial and human capacity to allow VFD to undertake their responsibilities. Monitor and collect data including those by VNSO to understand the demand for marine resources, as well as trends useful for management intervention. Undertake regular monitoring of resources and encourage research in the deep-water fishery stocks. Ensure effective monitoring of impacts to species of special interest - bycatch species and ensure WCPFC Conservation and Management Measure requirements are updated in regulations.
	Aquaculture 	A small-scale fishery that is being promoted as a fisheries management tool, as well as for livelihood opportunities.	
	Offshore fishery 	An important revenue earner for the country, although its contribution to the GDP has not reached its potential. Longliners and purse seiners are the 2 types of fishing methods. The value of the offshore fishery is USD32.6 million by foreign vessels, and USD1.8 million for local vessels (for 2014). Management of targeted stocks is being overseen the WCPFC.	
	Deep Water fishery 	A small but important fishery that employs many locals. Over 100 small boats are involved. Target stocks are highly vulnerable to over-exploitation, and there is still a lot to learn and know about the fishery.	

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Coastal Water Quality		Monitoring of coastal areas has been undertaken mostly in Port Vila. The results showed high bacterial contamination in many sites, especially at Erakor Lagoon. The lack of sanitation infrastructure and poor conditions of existing sewage systems are key factors.	The Department of Water Resources is the key agency overseeing the state of coastal waters. A monitoring programme is in place for Port Vila and Luganville with international guidelines used as the monitoring standard. High contamination of Port Vila coastal sites has resulted in a ban imposed on recreational use of the area, and occasional bans in other sites when results indicate unsafe waters. Additional legislation on septic soak-aways is being drafted. Recommendations Improve sanitation infrastructure around urban areas to reduce and eliminate waste from entering the coastal water. Provide engineering solutions to improve the flushing of water at the Erakor Lagoon. Review and draft legislation to assist with managing the sanitation issue. Expand the monitoring programme to priority areas around the country.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Marine Protected Areas		Conservation of marine resources continues to increase in Vanuatu. Many communities are declaring tabu areas of which over 110 are marine based, 40 terrestrial and 5 terrestrial/inland waters. Many sites are traditionally managed, some are registered with the Government. Some network MPAs are established (e.g. Nguna-Pele) through the effort of NGOs, community and the Government. Some conservation areas are established by VFD (e.g. SS President Coolidge's wreck). About 34% of the reef areas are managed, which represents only 0.2% of the total marine area.	Traditional kastoms, like tabu areas, have contributed to more areas being protected. Communities can register their coastal areas for protection under the environmental legislation or the Fisheries Act. 34% of Vanuatu reef areas are managed. A national target to protect 30% of Vanuatu's EEZ is currently being implemented through marine spatial planning and identifying (SUMA) special and unique marine areas. Recommendations As soon as practical, declare 30% of Vanuatu's total marine area as a national managed conservation area. Review the National Conservation Registry and identify areas that need to be improved. Build the capacity of VFD, VNSO, DEPC and other government staff, to improve data collection, assessment, management and storage. Raise the awareness of communities on the importance of registering their conservation site, and encourage their participation in the process.

3.3.1 Coral Reef and Marine Resources



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 58 (e)	National Sustainable Development Plan ENV 2; 4; 5;
				Pacific Island Regional Ocean Policy	National Environmental Policy & Implementation Plan GOAL 3
				Pacific Oceanscape	National Ocean Policy 6.1.2
				SPC – The Noumea Strategy Pacific Coral Reef Action Plan 2021-2030	Standard operating procedures for Community Based Fisheries Management Vanuatu National Roadmap for Coastal Fisheries: 2019-2030 Vanuatu National Fisheries Sector Policy 2016-2031

Indicator Definition

In assessing the state of reef health in Vanuatu, the focus is on the percentage of live coral cover throughout the country. Ideally, long-term monitoring of the same reefs would provide a good reflection of the reef status, the impact from global or local pressures and the resilience and recovery capability of the reefs. In addition to the live coral cover, the state of marine resources is also a reflection of the state of the marine environment. Some of the marine resources data are included in this indicator.

Status and Key Findings

Most of the islands of Vanuatu are encircled by discontinuous fringing reefs, but there is a small atoll formation north of Efaté and a few barrier reefs within the island chain. In general, the fringing reefs are best developed on the eastern and northern island coasts. Often, they consist of narrow reef flats often growing directly from shore. Unlike the smaller islands, both Espiritu Santo and Malekula both have wide fringing reefs with respectable back reef (lagoon) habitat. The shallow reefs are dominated by coralline algae, plate corals and branching forms. Below 5 metres massive and branching corals dominate. Marine biodiversity is high on the reefs of Vanuatu, with more than 450 fish species recorded (Johnson et al. 2019). The Fishbase, an online database, listed 778 marine fish species for Vanuatu (www.fishbase.de). Vanuatu has 295 hard corals (Johnson et al. 2019). Live coral cover varies widely throughout these islands due to the frequency of cyclones, along with the unusual level of seismic activity and occasional infestations of crown-of-thorns starfish (<https://www.coral-reef-info.com/vanuatu-diving/>).

One of the last major surveys of Vanuatu's marine environment was conducted in 1988, providing the baseline information on the country's coral reefs and marine species (Done and Navin 1990). The survey described the condition, character and baseline information about coral reefs and seagrasses for 35 locations through Vanuatu.

Vanuatu's coral reef exhibit a range of characteristics expected of an archipelago including:

- Fringing reef is the predominant reef type in the country. (e.g. encircling most of the islands from Efate southward). A reef that is part of the shore, or borders it with an intervening shallow channel or lagoon.
- Barrier reef: Separated from a mainland or island shore by a deep channel or lagoon.
- Atoll reef (e.g. Rowa Islands): More or less circular or continuous barrier reef that extends all the way around a lagoon without a central island
- Patch reef (e.g. South Malekula): Common, isolated, comparatively small reef outcrop, usually within a lagoon or embayment, often circular and surrounded by sand or seagrass.

The exposed coral reef slopes and crests were dominated by coralline algae and robust plating and branching corals (*Acropora* and *Pocilloporidae*), changing to dominance of a mix of massive and branching corals 3 to 5 meters below the level of the reef flat (Done and Davin 1990). Sheltered parts of the outer reef were characterised by various species of *Acropora* and *Montipora*. Massive *Porites* were dominant in open embayments, whereas sheltered embayments were dominated by soft corals. The threats to some of Vanuatu's reefs include cyclones, crown-of-thorns starfish outbreaks, sedimentation, natural disasters and climate change. Some of the exceptional reefs include those at Inyeug, Aneityum,

Cook Reef, Hog Harbor, Santo, Reef Islands, and Ureparapara (Done and Navin 1990). Other important reefs include those around Efate, Santo, Tanna, Malekula, Pentecost, Ambae and Ambrym, where almost 80% of the population lives and where the vast majority of tourism is concentrated (Naviti and Aston 2000). The 1988 surveys compared their results to a survey undertaken three years earlier and concluded that the reefs have deteriorated by as much as four times (Done and Davin 1990).

A decade after the surveys of 1988, a renewed interest in coral reef health saw the establishment of long-term monitoring sites by the Fisheries Department and some Non-Governmental Organisations (e.g. ReefCheck Vanuatu). Surveys of the long-term monitoring sites were, however, inconsistent. Some results from some of the sites taken between 2005 and 2007 (approximately 57 sites from around 11 areas) found a diverse coral cover ranging from < 5% of live coral cover in Luganville, 49% in North Efate and 58% at Bakura (Raubani 2009; Pakoa 2007, Morris and Mackay 2008, Chin et al. 2011).

Surveys in 2016 found high hard coral cover and low macro algal cover in the NW of Efate, around Moso and Lelepa islands, and at Emau Island, while reefs in Undine Bay and around Nguna-Pele islands had low coral cover and high macro algal cover (Johnson et al. 2016).

The latest live coral cover estimates for full country coverage and scale have been determined through remote sensing data from Allen Coral Atlas datasets (<https://www.allencoralatlas.org/>).

Vanuatu's reefs are highly impacted from local threats according to Chin et al. (2011) (Table 15). Fishing pressure was evident at some of the sites, especially species that are prized for the aquarium trade (*Cromileptes altivelis*) and for consumption (*Bolbometopon muricatum* and *Cheilinus undulatus*).

Table 15: Vanuatu's threatened reefs compared with the rest of the Pacific and Global. (Chin et al. 2011)

COUNTRY	Reef Area (km ²)	Total Reefs Threatened (%)
Vanuatu	1,803*	92
Pacific Region	64,736	48
Global Total	249,713	61

Johnson et al. (2019) noted that reef damage is spatially variable. For example, the Category 5 Cyclone Pam struck Vanuatu in 2015 and the damage to the reefs in the northeast part of Efate was severe, whereas areas away from the path of the cyclone, were unaffected. Another example is coral bleaching affecting corals in sheltered bays, with minor impact on corals in outer reef areas. The recovery from these impacts was said to be fast, with coral re-growth

seen a year after Cyclone Pam struck. Other factors affecting reefs include volcanic activities, land-based pollution sedimentation and crown-of-thorns starfish outbreaks. While there is legislation relating to the management of coral reefs, the documentation of how well these reefs are managed is poor. Those that have been managed based on community efforts have been found to be in good health (Table 16).

Table 16: Assessment of the state of Vanuatu's reef, resource use, pressure and management. (adapted from Chin et al. 2011)

REEF CONDITION	REEF HEALTH AND RESILIENCE	REEF RESOURCE USE	FACTORS AFFECTING REEF HEALTH	MANAGEMENT AND GOVERNANCE
Data not available	Data not available			

Impact

Coral reef degradation can have a serious impact including coastal erosion and food security for local communities. With the prediction of exacerbating climate impacts from a warming planet, coral reefs and marine resources will be greatly affected. The elevated sea surface temperature and the increased acidification will affect the life cycles of many species, as well as the dissolution of calcium carbonate, which is the structure of reefs and shells of many marine organisms. The impacts to communities will be catastrophic, as erosion of the coastal areas will allow rising tides to encroach on to low-lying settlements and affect gardens and agricultural crops. Food security will also be an issue with marine resources becoming scarce.

Response

A review of Vanuatu's policies and legislation on the management of the ocean has been completed (Muldoon et al. 2015). Key legislation relevant to coral reefs include:

- Environmental Protection and Conservation Act 2011
- Fisheries Management Act 2014
- Maritime Zones Act 2010
- Custom Land Management Act 2013
- Convention on Biological Diversity (Ratification) Act 1992
- Foreshore Development Act 2013
- National Parks Act 1993

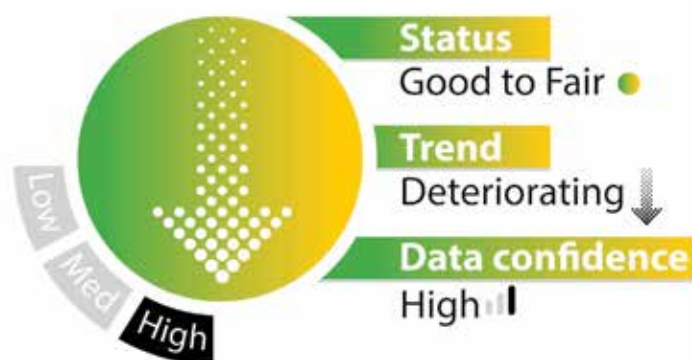
Vanuatu undertook marine spatial planning as an important contribution to effective management of its ocean (Wendt et al. 2018). The marine spatial planning identified unique marine areas both in the inshore and offshore areas. Some of these unique areas are good candidates as marine protected areas. Further refinement of these areas will need to be discussed by local stakeholders.

The Fisheries Regulation Order No. 28 of 2009 provides some protection for inshore coastal areas that are under conservation, as well as managing the aquarium trade to safeguard live corals and other marine species. The Environmental Protection and Conservation Act also provides for the conservation of marine resources through the identification of sites having national biodiversity significance and working with communities to establish community conservation areas.

Recommendations

- Continue to monitor the coral reefs, especially using the long-term monitoring sites established under the Global Coral Reef Monitoring Network and ReefCheck to observe trends and impacts. This will provide the information that is key to informing management actions.
- Encourage communities to undertake some monitoring of their resources, especially in tabu and community conservation sites.
- Secure financial support to allow for monitoring and surveying of coral reef sites to continue.
- Raise awareness and continue to encourage communities to protect and conserve their reef resources.
- The marine spatial planning has identified important sites for protection and conservation. It is important that these sites be used as conservation areas for the protection of marine biodiversity and resources.
- Encourage the inclusion of coral reef sites as part of a national review and update of wetlands.
- Resurrect the ReefCheck programme, as this allows communities to participate in coral reef monitoring.
- Review existing legislation to strengthen the management of coral reef ecosystems.
- Encourage the inclusion of traditional management systems in the protection and conservation of marine resources.
- Encourage the sharing of information and results through an agreed national framework, including a national repository for the long-term storage of data.
- Identify key threats to marine resources and request assistance through partners to assist in managing these threats. Some threats may be managed at the local levels, whereas others that are transboundary or global may require governmental support.

3.3.2 Fisheries



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 14.C.1	Codex Alimentarius	SAMOA Pathway 53,59, 68, 94	Fisheries Act
			CITES	Noumea Convention (SPREP)	Environment Management and Conservation Act
			UNCLOS	New Song Noumea Strategy (SPC)	Pollution (Control) Act
			FAO Code of Conduct for Responsible Fisheries	WCPFC	Animal Importation and Quarantine Act
				Pacific Island Regional Marine Species Programme 2022-2026	Vanuatu National Strategy for the Development of Statistics
				Pacific Coral Reef Action Plan 2021-2030	National Oceans Policy
					Standard operating procedures for Community Based Fisheries Management
					Vanuatu National Roadmap for Coastal Fisheries: 2019-2030
					Vanuatu National Fisheries Sector Policy 2016-2031
					National Sustainable Development Plan ENV 1; 2; 4; SOC 1; 2; 3;4
					National Plans for Actions (Sharks, Seabirds and Marine Turtles) currently being drafted.

Indicator Definition

With around 2,528 km of coastline and 4,110 km² of coral reef that support coastal fisheries, the social and economic development of the country depends to a large degree on the marine environment. Two-thirds of the population lives within one kilometre of the coast, where there is a strong dependence on marine resources for people's livelihood and sustenance. Many marine species, especially fish, are central to people's cultural identity.

The fisheries section of the SOE is concerned about the population of fisheries stocks being targeted for subsistence, artisanal and commercial use. The commercial fishery involves medium to large local and internationally registered vessels with the sole purpose of catching fish for selling at the international market. Artisanal fishing targets coastal fisheries with the purpose of selling to restaurants and at the local market. Subsistence is for home consumption. The state of the three fisheries is dependent on the data that is collected. The Vanuatu Fisheries Department and the Vanuatu National Statistics Office are the two main data providers for this indicator.

Status and Key Finding

The Vanuatu Fisheries Department is the national authority responsible for the management of Vanuatu's fisheries resources. Its key mission is to ensure sustainable management, development and conservation of fish resources to achieve maximum social and economic benefits to present and future generations. Under the VFD, the Coastal Fisheries and the Offshore Fisheries are assessed with regards to fisheries stocks, value and conservation measures. The Coastal Fisheries include subsistence, artisanal, aquaculture, aquarium trade, deep sea fishery and FADs. The Offshore Fisheries are nationally registered vessels, or distance water fishing vessels that have a license to operate within Vanuatu's EEZ.

Subsistence fishery

The monetary value of Vanuatu's subsistence fisheries has been calculated at USD6.5 million, and USD5.2 million for artisanal (semi-commercial) (Gillett 2016). The volume harvested is estimated at 2,800 mt (MACBIO). There is some freshwater fishing carried out, mostly by rural communities, but no data are collected. Gillett (2016) estimated the annual harvest at 88 mt and a value of USD340,000 per annum. Based on the assessment by Gillett (2016) and others, coastal fisheries production continues to increase. Figure 41 shows two sharp increases in fish harvest; the first from 2018 to 2019, and the second from 2019 to 2020. These increases are largely due to improved data collection, including an increased in the number of surveyors, as well as the landing sites surveyed (Ida pers comm. 2022).

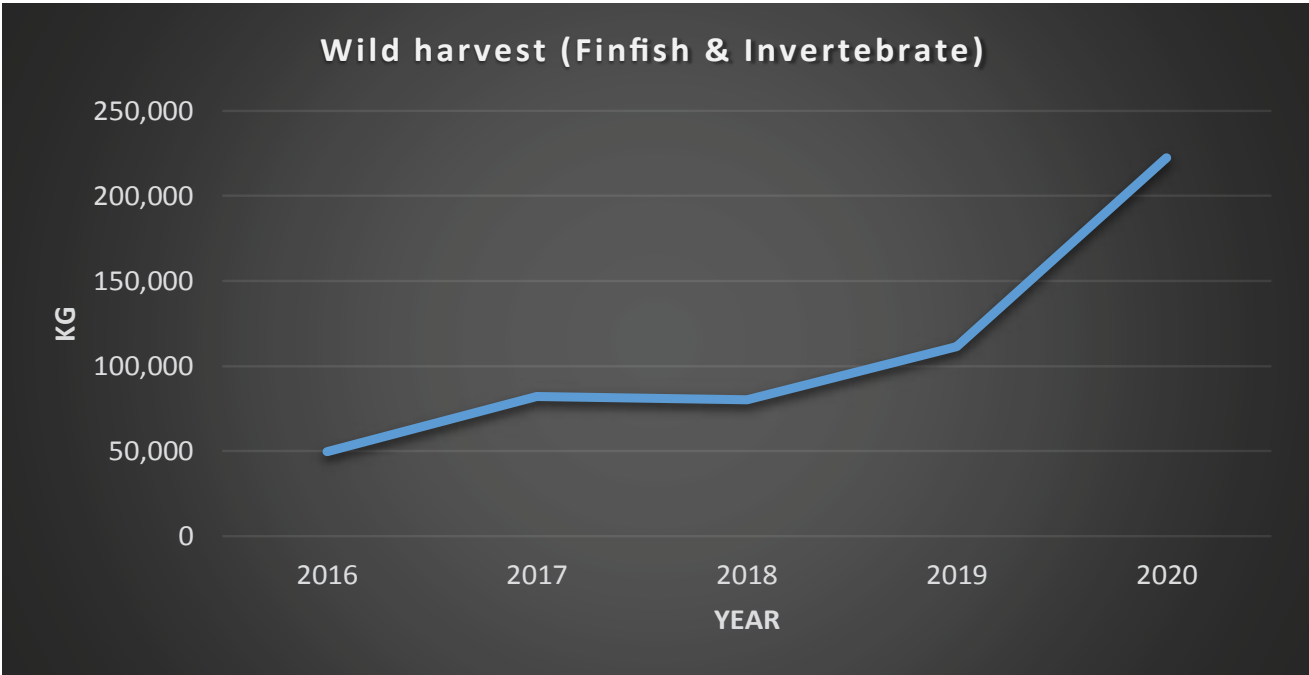


Figure 41: Harvest of fish and other marine invertebrates for consumption. (Source: Gillett, 2016; Vanuatu Fisheries Department, 2022.)

The coastal fisheries remain critically important to all rural and remote communities throughout the country, as food security but also as revenue to purchase goods and pay for children's education. Fishing in the coastal areas helps strengthen the value and importance of traditional ecological knowledge. It is where traditional knowledge holders are able to demonstrate and share with the next generation, on matters such as species diversity, species life-history and the connections between the species and the environment, or the weather and the seasons. One of the interesting features of the coastal fisheries is the gender roles, where men tend to do offshore fishing, whereas women and children fish the nearshore and shallow reef areas.

In the 2020 National Population and Housing Census, 40% of households throughout the country are engaged in fishing (VSNO 2020), which is a decline from 49% in the 2016 survey (VNSO 2016). Most of the fishing households are in the rural areas (58%), with only 23% of households in urban areas that go fishing (VSNO 2016).



Figure 42: Subsistence fishing. (Source: Australian Govt. Department of Foreign Affairs.)

The province with the highest number of households participating in fishing activities is Torba (77%), followed by Sanma (49%), Malampa (46%), Shefa and Tafea (43%), Penama (36%), Luganville (18%) and Port Vila (10%) (2010 HIES).

The Vanuatu 2010 HIES found that more than 75% of the adult population practises at least one form of fishing, whether subsistence or commercial. The survey showed that 2% of urban households and 12% of rural households had income from the sale of fishery products.

Aquaculture fishery



Figure 43: Prawn farm. (Source: Australian Govt. Department of Foreign Affairs.)

Aquaculture is an important focus for the country in terms of its contribution to food production and food security. There is an emphasis in the aquaculture sector of engaging with rural communities. Aquaculture remains a small-scale operation either privately or commercially run (Figure 43).

The Vanuatu Fisheries Department operates a small hatchery producing trochus shell (*Rochia nilotica*) and green snails (*Turbo mamoratus*) for re-seeding of reefs. In the past, the VFD did some experimental work in culturing Pacific oyster, rabbitfish, prawns, tilapias, seaweeds and giant clams. The aquarium trade, which usually harvests materials from the wild, is often included in the aquaculture fishery. The VFD recorded USD1165 worth of corals (275 pieces) exported in the year 2000 (FAO 2022). Vanuatu has developed its Aquaculture Development plan and established an Aquaculture and Fisheries Association, one of the first in the Pacific region. Data on aquaculture remain small and efforts to improve this are currently being implemented.

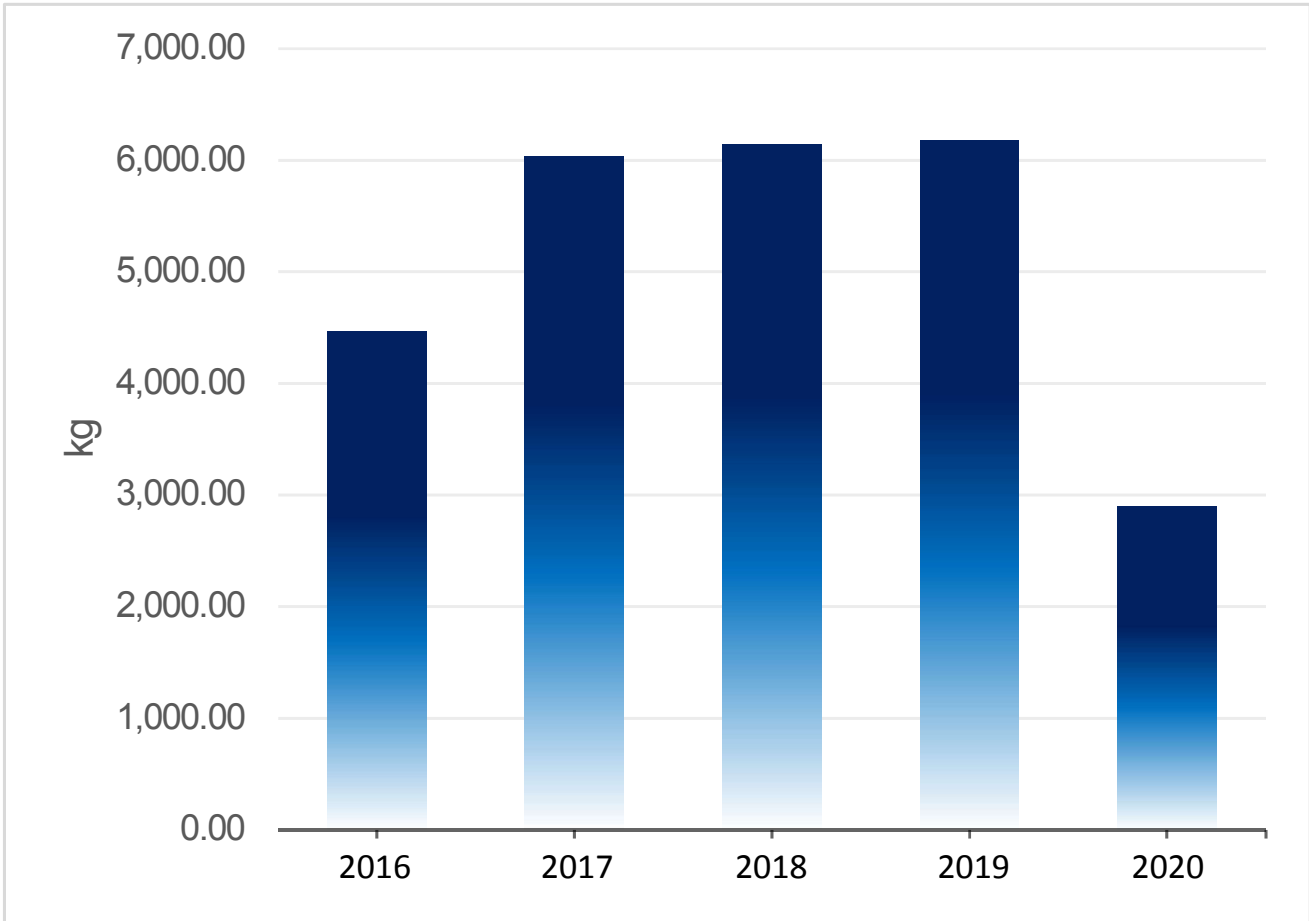


Figure 44: Volume of marine resources harvest from aquaculture and aquarium trade operations. (Vanuatu Fisheries Department 2020)

Deepwater fishery (Artisanal fishery)

While tuna is the main large-scale fishery resource in Vanuatu’s waters, deep water fisheries extending beyond the reef and onto the upper slope are a small but important resource for Vanuatu in terms of fishery employment (for small local operators and artisanal fishers) and local food. Over 100 small boats are involved in fishing for deep-water snapper, with several larger vessels fishing offshore and deep-water snapper continuing to be an important catch around the main islands, where they support domestic and some small export markets (SPC 2013a). However, as deep-water species are often vulnerable to overfishing, careful management is required to ensure such fisheries are sustainable. Line fishing is the main method used for these species. The gear used includes hand-reels and powered reels, with some commercial bottom longlining and trot

lining.

There have been several attempts to estimate maximum sustainable yield (see Dalzell and Preston 1992), with annual tonnages ranging from 100 tons to 800 tons, although 300 tons is a more likely upper limit (SPC 2013b). The data set on all known deep-water snapper location records compiled by Gomez et al. (2015) was used with fisheries and oceanographic data to model the distribution of 14 deep-water snapper species. Results were based largely on depth, and they indicated a potential total biomass of 980 tons. However, there are currently no reliable estimates of sustainable levels of catch and effort, and a poor understanding of stock structure. Such fisheries in the region as a whole have struggled due to low catch rates following an initial fishing-down phase, variable export

markets and prices, shipping costs and limited habitat area (McCoy 2010). Deepwater snapper stocks are vulnerable to overfishing due to their localized seamount and slope distribution, high longevity, late maturity and slow growth (Williams et al. 2013).

Improved knowledge of stock structure, and the degree of seamount-affinity, are issues of major relevance to management. The likelihood of restricted distributions of these deep-water species means there is a need to consider regulations specific to seamounts, or to localised areas of suitable fish habitat. This will help to reduce the risk of serial depletion that occurs when the fishery can move from one place to the next if total catch limits are set for a large area.

Deepwater fisheries over the period considered were a small but important resource for Vanuatu. However, little is known

about stock structure, stock size, and productivity, thereby making the long-term sustainability of historic catch levels uncertain.

Offshore fishery

The VFD collect data from vessels fishing in Vanuatu waters and beyond. Data include fishing gear, location, fishing effort, species and weather conditions. Vanuatu's offshore fishery is one of the least developed in the Pacific region and the fisheries contribution to GDP is among the lowest (Figure 45). The most recent estimates suggest that the fishery contributes less than 1% to Vanuatu's annual GDP (Table 17) (Verdone and Seidel 2012). The Vanuatu National Statistics Office noted 0.9% of the GDP for the period 2018-2019, 2019-2020 was from fishing (VNSO 2022).

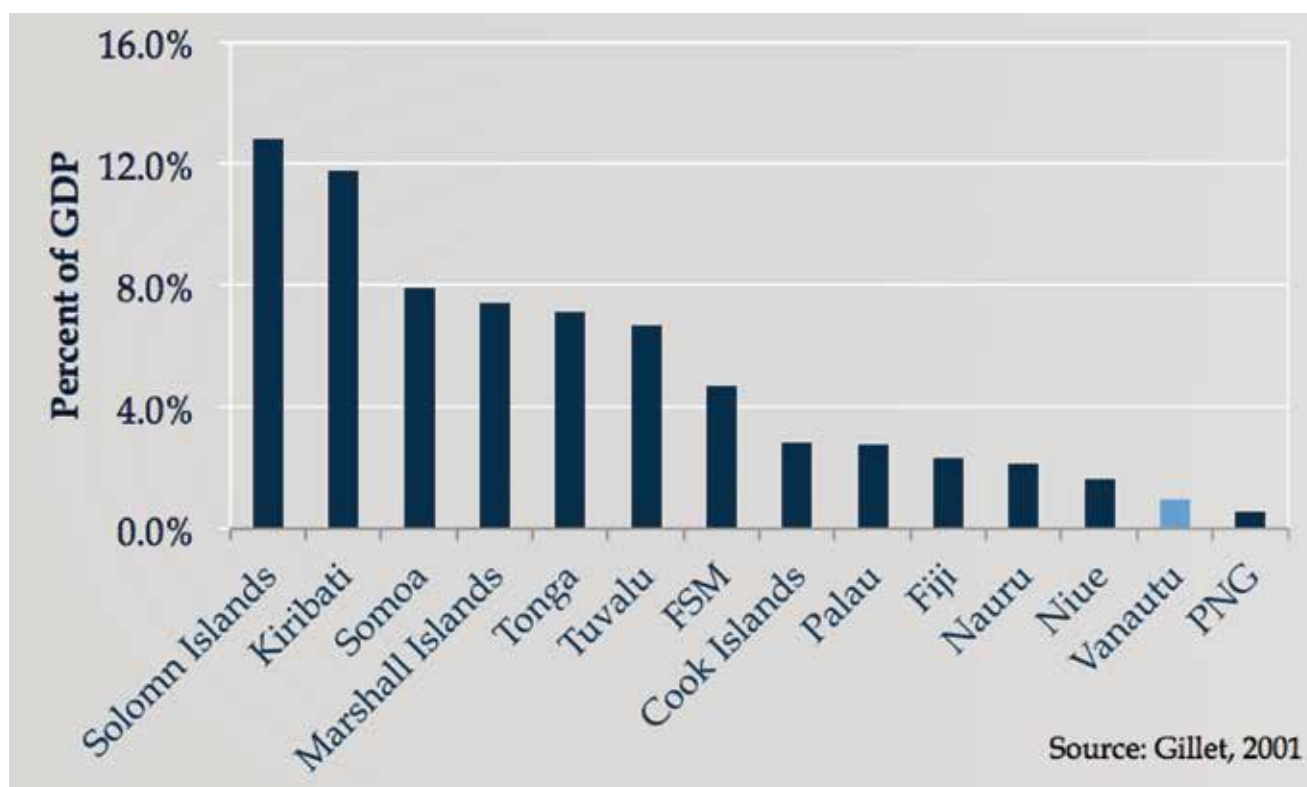


Figure 45: Fishing revenue as a % of GDP. (Gillett 2001)

Vanuatu's offshore commercial fishing fleets are both foreign owned and/or locally owned. The number of locally owned is much smaller compared to foreign vessels, therefore their catch is expected to be a lot less (Figure 46). The number of longliners varies from 26 to 73 vessels per year from 2001 to 2010 (WCPFC 2017). The number of vessels is steadily increasing, for example in 2014, Vanuatu issued licenses to 82 longliners and 3 purse seiners (Gillett 2016), which also corresponds with the increased catch (approx. 16,000 MT in 2015). In 2019, 70 vessels were operating in Vanuatu waters. The licensing is where some of the revenue is generated. In 2008, the Government collected USD1.4 million from licensing registration fees (Verdone and Seidel 2012). The fees are based on the size of the vessels, but according to ADB (2000), the fees are very low. One of the challenges for Vanuatu's offshore fishery is that the most productive fishing areas are outside of its EEZ.

The value of the offshore catch in 2014 was USD1.8 million (approx. 437 mt) (FFA 2015). The foreign-based offshore catch in 2014 was estimated at USD32.6 million (approx. 8,417 mt) (Gillett 2016).

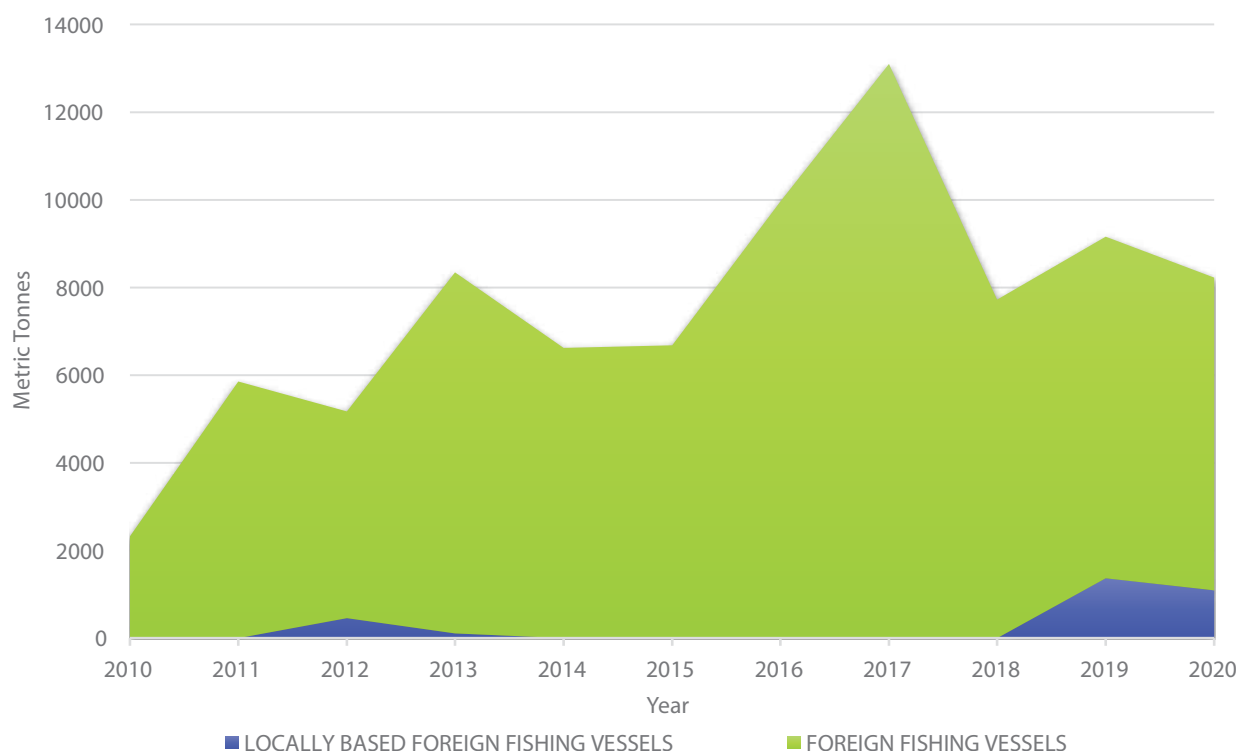


Figure 46: Catch of local and foreign vessels for 2010 to 2020 period. (Vanuatu Fisheries Department 2021)

Table 17: Fishing contribution to GDP (VT millions). (Gillett 2016)

COUNTRY	2011	2013	2014
Commercial fishery	138	121	109
Subsistence fishery	344	367	376
Total fishing contribution	482	488	485
National GDP	70,873	72,415	75,803
Fisheries % GDP	0.68%	0.67%	0.64%

Tuna are the basis of the offshore commercial fisheries for many island nations in the Pacific. Four main species are taken: skipjack (*Katsuwonus pelamis*), albacore (*Thunnus alalunga*), bigeye (*Thunnus obesus*) and yellowfin (*Thunnus albacares*). These species are highly migratory, and their abundance varies considerably. Overfishing concerns of these species led to the establishment of the Western and Central Pacific Fisheries Commission (WCPFC), which oversees the management and monitoring of the fishery for the western Pacific Ocean (longitudes of 150°W in the North Pacific and 130°W in the South Pacific). Within the region, there are an estimated 3,000–4,000 vessels operating each year, and the total tuna catch exceeds 2 million tons annually.

Knowledge of the catch composition, amounts and distribution is necessary to understand how best to balance the exploitation of the resources with the conservation of stocks. The estimated quantity of catch in Vanuatu from 2010 and 2020 is shown in Figure 47, and by species in Figure 48.

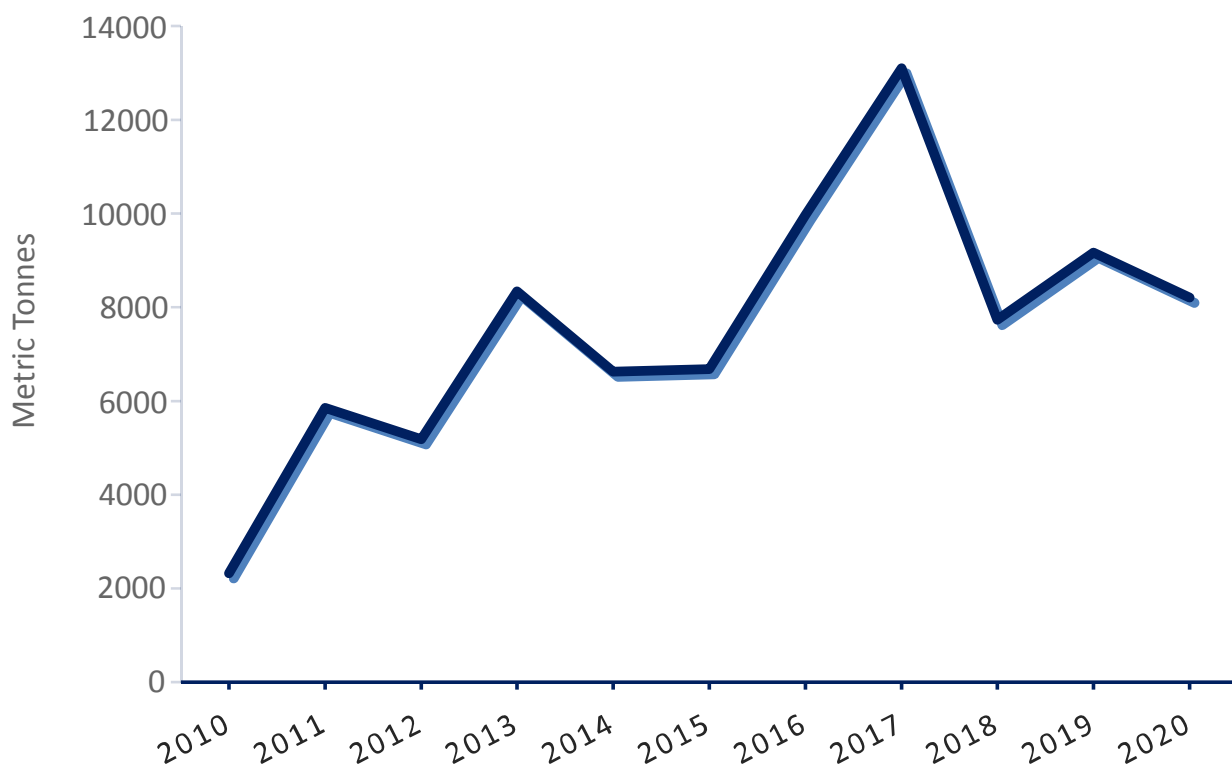


Figure 47: Commercial catch from the offshore fishery within Vanuatu's EEZ. (Vanuatu Fisheries Department 2021)

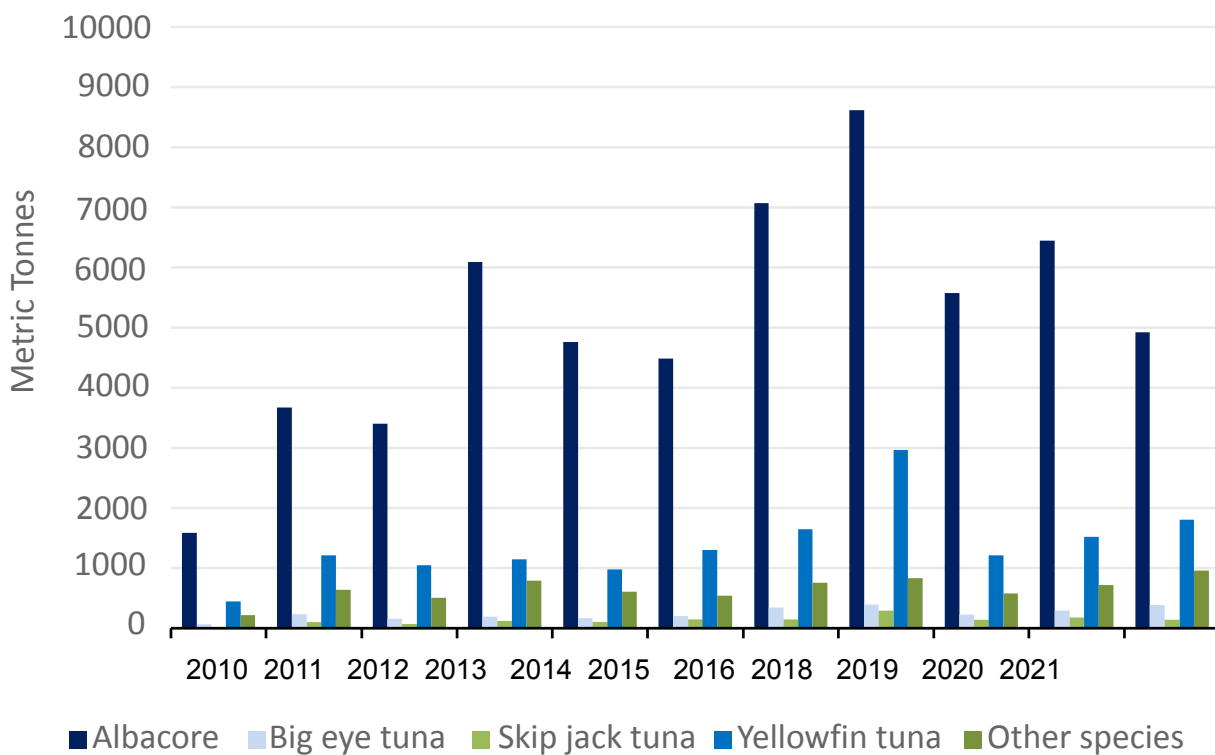


Figure 48: Catch by species within Vanuatu's EEZ. (Vanuatu Fisheries Department 2021)

Most of the tuna catch occurs in areas towards the edge of the provisional EEZ boundary, far from the main island ridge, with catches concentrated in the northwest and east. Unlike some other Pacific island nations, catches do not appear to be closely correlated with seamounts, even though these are known to host higher catch rates of yellowfin and, to a lesser extent, bigeye tuna (Morato et al. 2010). The distribution of tuna and their fisheries is influenced by oceanographic events, particularly the El Niño–Southern Oscillation (ENSO) period. Fish distribution is also expected to shift with climate change, potentially moving to the east and to higher latitudes (Lehodey et al. 2011). Climate change is expected to have an overall negative impact on the offshore fisheries.

With much of the fish, catch being taken by large foreign vessels, license fees increased in 2015 in a bid to increase revenue while ensuring the fisheries' long-term sustainability. The importance of both purse seine and longline fisheries to different species means that national and regional conservation efforts must carefully manage different fishery characteristics to ensure they are sustainable in the long term.

Impact

Excessive exploitation of marine resources can have serious environmental consequences, including species extirpation and extinction, and food security challenges for communities. Some species in particular are more vulnerable to overexploitation because of their life history characteristics e.g. sharks. Some of the pressure on the coastal fisheries is beyond national control including natural disasters, climate change and pollution (VFD 2019). Land-based pollution will cause degradation to coastal environments, and therefore affecting the subsistence and coastal commercial fisheries. With population increased and migration to urban centres, the demand for marine resources is likely to increase. It is estimated that this demand will increase to 145% for urban centres and 37% in rural areas, thereby putting enormous pressure on coastal fish supply by the year 2034 (Bell et al. 2009).

Response

The Vanuatu Fisheries Department is the key government agency responsible for managing the country's fisheries resources. VFD are guided by the Fisheries Management Act (No. 10 of 2014), the legal instrument. In addition, the Convention for the International Trade of Endangered Species (CITES) also has an important role in ensuring trade of Appendix II listed species such as sharks is sustainable. The Vanuatu CITES legislation is managed by the Department of Environmental Protection and Conservation (DEPC) as the Management Authority, approving all permits for trade of these species. The VFD is responsible for preparing Non Detriment Findings (NDFs) to ensure trade of these species is sustainable and legal as a Scientific Authority under CITES.

The Vanuatu National Fisheries Sector Policy 2016-2031 sets the fisheries sector agenda over a 15-year period. One of the Strategic Policy Objective relates to environmental management, climate change adaptation and disaster risk reduction (SPO 5). Actions under SPO 5 include EIA and baseline studies, community-based management, marine conservation areas and ecotourism ventures. The issues of compliance and illegal, unreported and unregulated fishing are also addressed in SPO 7 where all Vanuatu flagged and licensed fishing vessels are to be fully monitored as part of the country's effort to reduce and eliminate these illegal activities in the offshore fishery. Domestic based fishing vessels are required to be registered and licensed, as part of Vanuatu's effort to reducing and eliminating IUU fishing (VFD 2017). The Vanuatu National Roadmap for Coastal Fisheries: 2019-2030 is designed to guide the sustainable development of coastal fisheries for the benefit of Vanuatu. The roadmap supports the objectives of the Vanuatu National Fisheries Sector Policy 2016-2031 and provides a framework for Vanuatu's implementation of the principles and commitments to community-based fisheries management.

The management of the offshore fisheries stock is governed regionally by the Western and Central Pacific Fisheries Commission, to which Vanuatu is a member. Conservation and Management Measures are agreed at the Annual Meetings and all members are required to implement these. In some cases these rules will need to be reflected in national legal instruments.

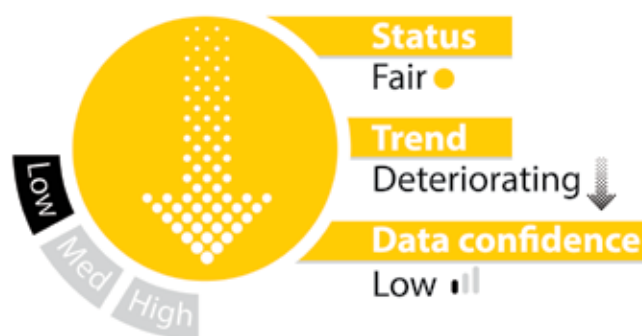
Recommendations

Vanuatu has developed good policies on the marine coastal environment, including the National Oceans Policy and the National Fisheries Sector Policy. Within these policies are actions that need to be urgently supported and implemented. The challenge is to secure the necessary resources, especially the technical and human capacity and funding, so that the implementation can proceed. Development partners are encouraged to assist with supporting the Department of Fisheries in the implementation of the Oceans Policy, the Fisheries Sector Policy, and other programmes relating to sustainable fisheries.

While it is encouraging that tuna fisheries in the Western and Central Pacific are currently considered to be sustainable, the 2018 Transboundary Diagnostic Analysis noted that stocks of commercially important species are declining (Vousden 2018). These fisheries will only remain sustainable if steps are taken to:

- Improve fisheries management and compliance
- Undertake research on the impacts of climate change on fisheries stocks, including migratory, pelagic, deep-water and shallow reef fish populations.
- Identify, mitigate and reduce land and marine-based pollution and activities that impact on the migratory tuna stocks.
- The impact of marine invasive species on fisheries stocks is yet to be understood, or assessed. It is strongly encouraged that marine invasive species surveys be undertaken to identify the presence of alien species and develop a management plan to prevent, control and eradicate any introduced population.
- Having a dedicated and fully equipped research facility would benefit Vanuatu's fisheries and marine environment by undertaking targeted research to identify and improve the management of fish stocks.
- Review existing legislation, and where appropriate develop new regulations to address any gaps that hinder management actions, such as the lack of regulations on fish size that can be legally harvested, and the need to introduce open and closed seasons to protect spawning species. Comply with WCPFC CMM requirements such as prohibiting finning of sharks.
- To improve the understanding on the fisheries stock, data collection is important. The past four years have demonstrated the value of investing in data collection, with much improved and accurate datasets that highlighted the under-reporting over the past decades. Funding is needed to ensure that the data collection continues to expand to include more sites and bigger coverage of the country.
- There is a gap in the volume and diversity of fish species being harvested, especially in remote areas where there are no fisheries officers. The data should be harvested and included in the assessment by the Vanuatu Fisheries Department. There is a need to develop a template that could be used to harvest the data, and also funding support to allow staff to collect the data from remote places.

3.3.3 Coastal Water Quality



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 14.A.1	Codex Alimentarius	SAMOA Pathway 53, 94	National Sustainable Development Plan Env 4; 5; ECO 2; 3
			Clean Seas	Noumea convention	Vanuatu's National Strategy for the Development of Statistics
			WHO – Guidelines on recreational water quality		Pollution Control Act
					National Wastewater (sewage) Regulation (draft)
					Recreational water quality regulation (draft)
					Water Resources Management Act
					Public Health Act

Indicator Definition

Monitoring of water quality provides an important indicator of the health of coastal and lagoonal waters. Surveys are usually conducted to see the presence and the level of a bacterium – Enterococci, E. coli and faecal coliform, which is found in the intestines of warm-blooded animals (and excreted in faeces). The presence of the bacteria in high numbers may indicate raw sewage, which can cause health problems for communities and marine life. While there are few results from most of the country, the sampling programme at Port Vila provides an excellent indication of the water quality in an urban environment.

Status and Key Findings

The quality of Vanuatu's coastal waters remains to be fully surveyed and documented throughout the country. Available data comes from the surveillance work undertaken by the Department of Water Resources in collaboration with the Vanuatu Project Management Unit (VPMU), Vanuatu Service Engie and the Department of Environmental Protection and Conservation. Monitoring sites are concentrated around Port Vila, specifically in areas where there is high human settlement and activities. Data include biological (E. coli, Faecal coliform, Enterococcus and Total Coliform), Temperature, pH, Conductivity, Dissolved Oxygen, Salinity and Turbidity (Kanas 2019, Devlin et al. 2020; Matariki 2020).

The results of the surveys undertaken from 2017 to 2019 (Figure 49) showed that some sites are of concern due to high bacterial contamination (Figures 35-38). Particular sites of concern in the 2019 surveys include the coastal areas off the Origin gas company, the Grand Hotel (sewage outlet and drainage area), Anchor In bar, Crystal Palace Restaurant and the Tebakor estuary (Kanas 2019). The high bacterial contamination has led to some areas of Port Vila being off limits for swimming including the Tebakor to Vaname and Port Vila Market House to Government Wharf. The First and Second Lagoons are also off limits due to contamination (Sammy pers. comm 2021).

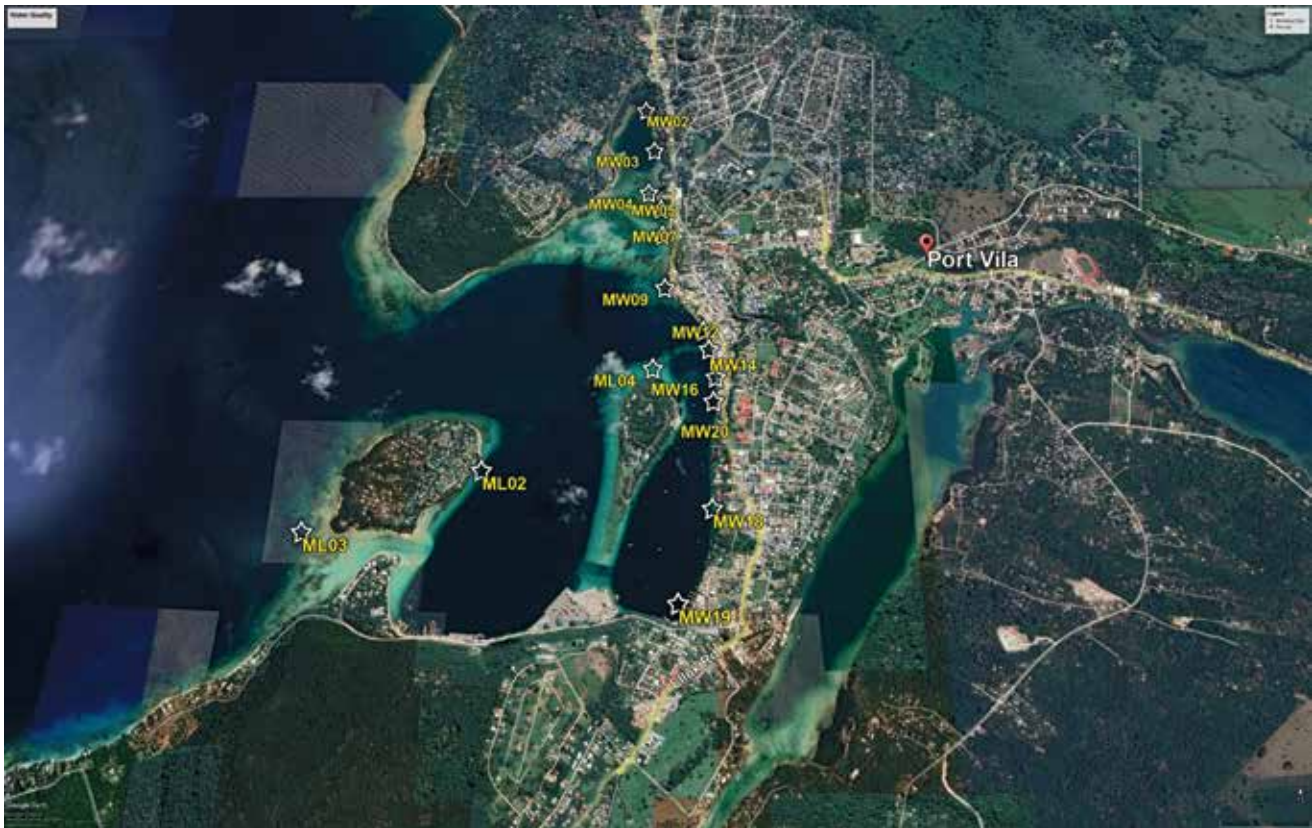


Figure 49: Water quality monitoring sites around Port Vila. (Google Earth; DoWR 2022)

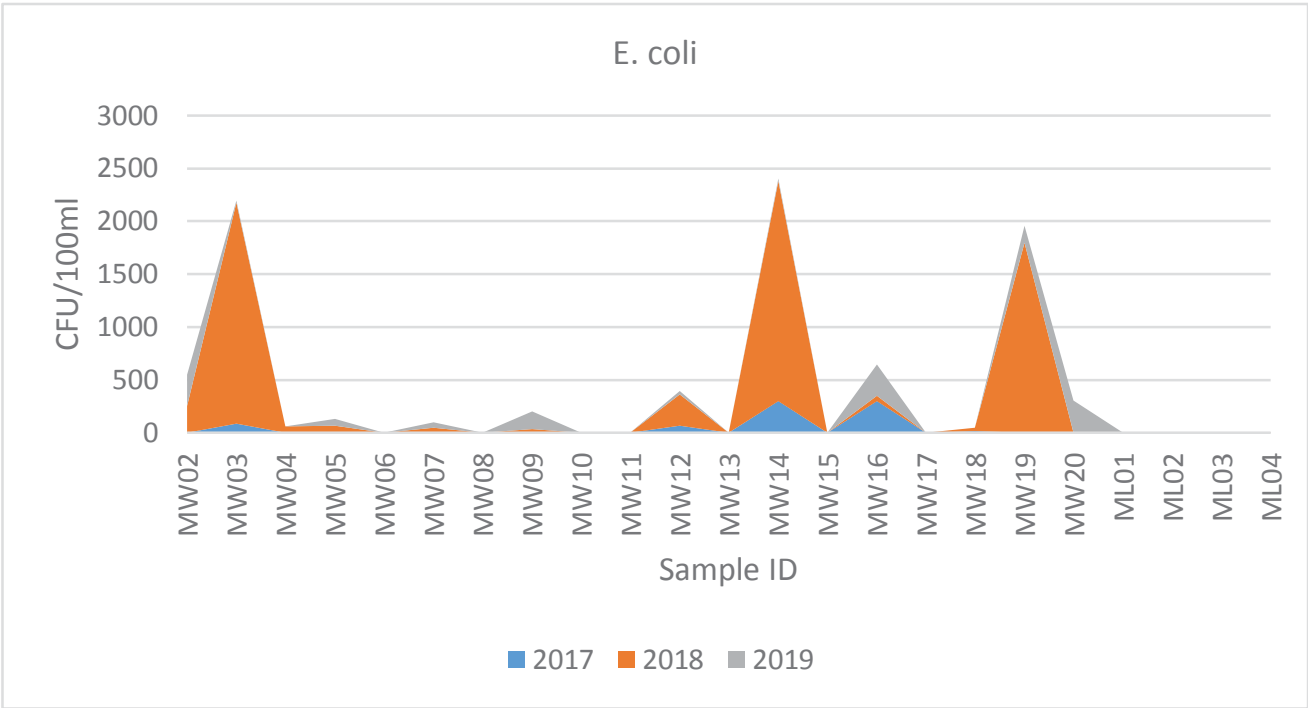


Figure 50: Results from 2017-2019 water quality surveys for E. coli. (Kanas 2019)

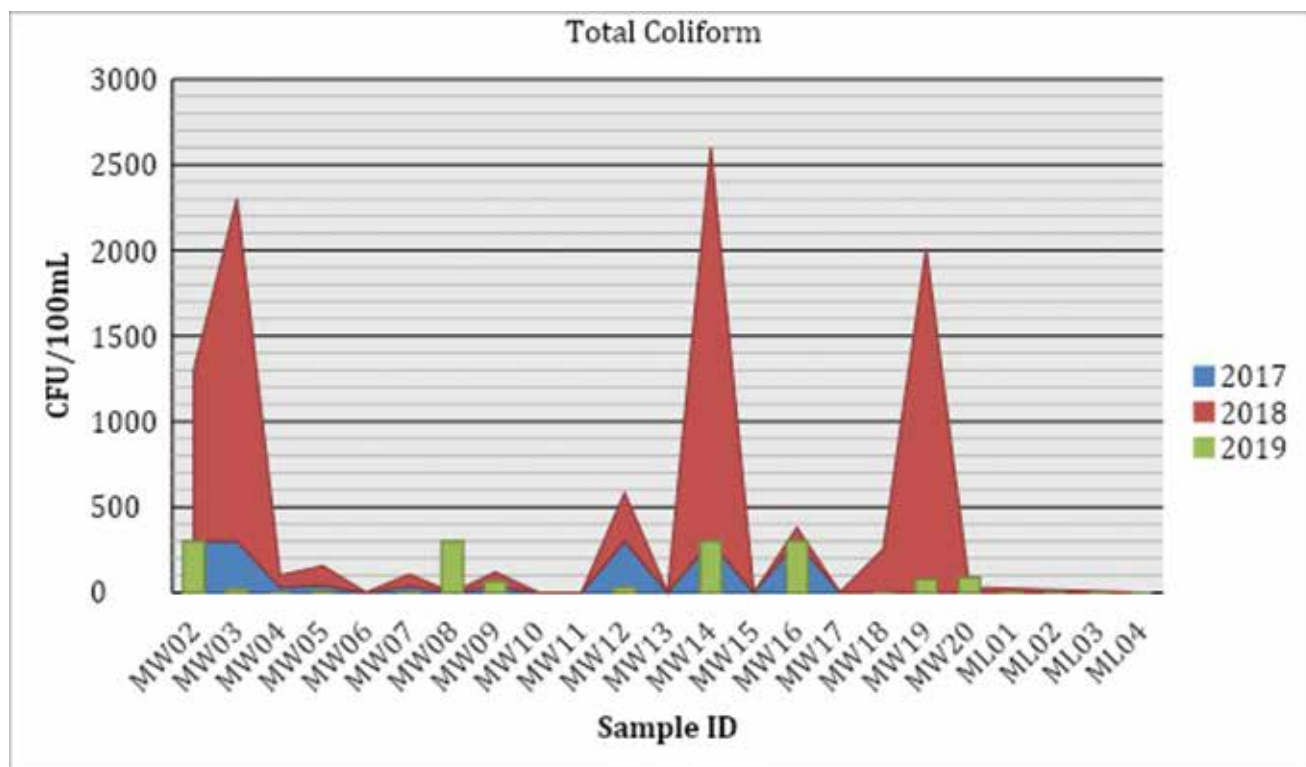


Figure 51: Results from 2017-2019 water quality surveys for Total Coliform. (Kanas 2019)

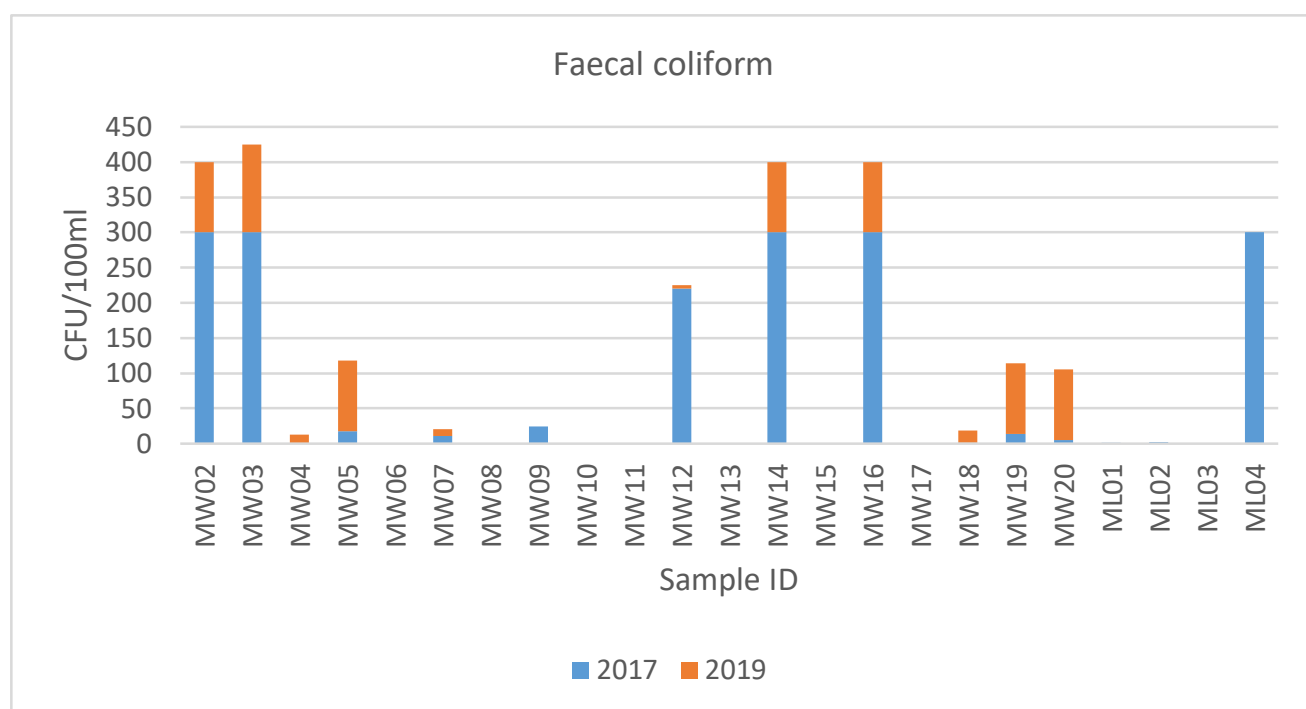


Figure 52: Results from 2017-2019 water quality surveys for Faecal Coliform. (Kanas 2019)

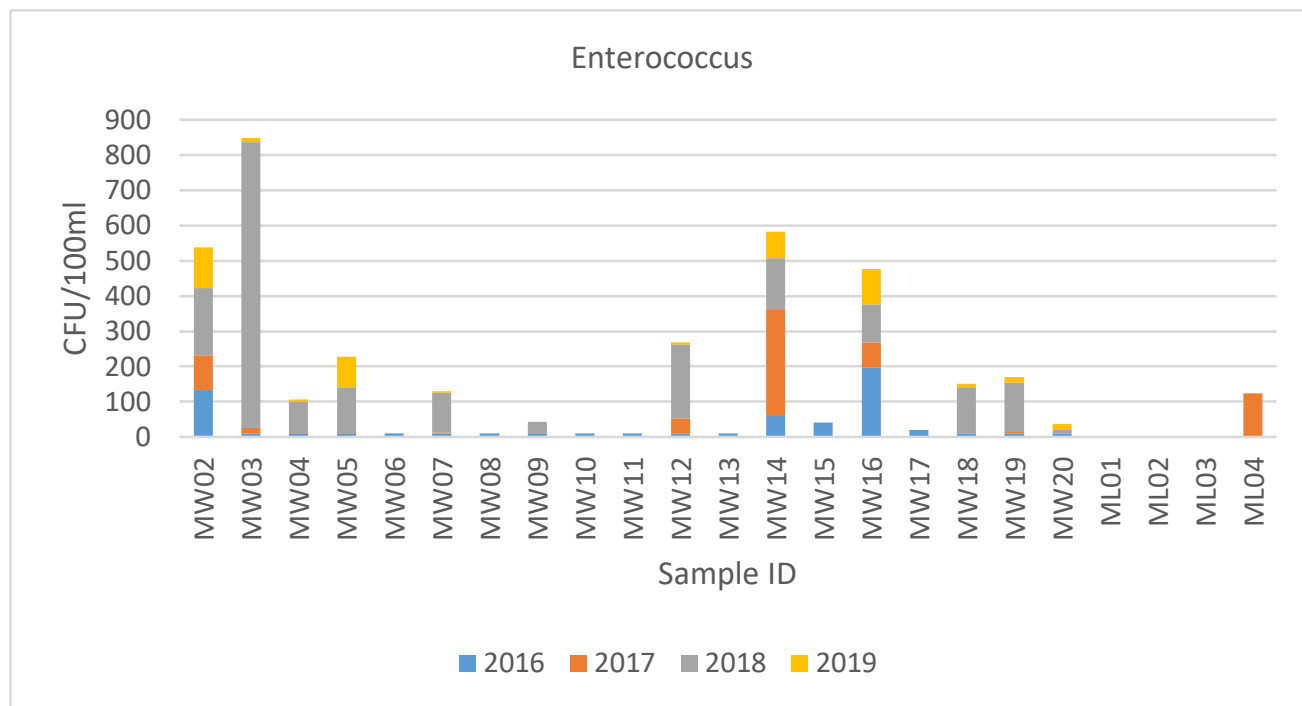


Figure 53: Results from 2017-2019 water quality surveys for Faecal Coliform. (Kanas 2019)

Water quality surveys undertaken around Erakor Lagoon in 2019 and 2020 (Figure 54), also found unsafe and very high-risk bacterial contamination (Table 18, Figure 55).

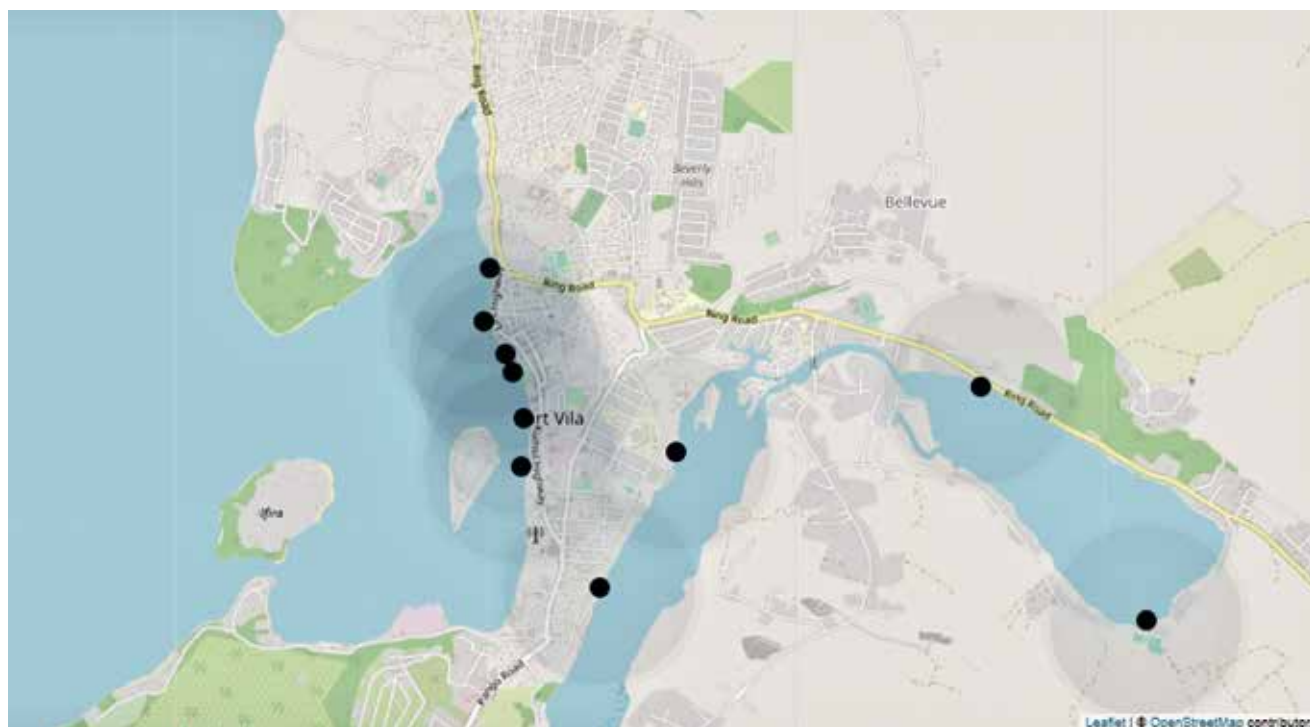


Figure 54: The monitoring sites for E. coli from Erakor Lagoon. (Coastal Water Quality Database – www.coastalwater.vu).

Table 18: Results of a 6 month survey for E. coli from five sites around Erakor Lagoon. (DoWR 2020)

DATE	site	E. coli	Total coliform	Risks
October 2019	Pacific Lagoon	>1000MPN/100ml	Yes	Unsafe
	Ramada resort	>1000MPN/100ml	Yes	Unsafe
	Hospital	>1000MPN/100ml	Yes	Unsafe
	Cocomo Resort	>1000MPN/100ml	Yes	Unsafe
	Lagoon 2	>1000MPN/100ml	Yes	Unsafe
November 2019	Pacific Lagoon	483MPN/100ml	Yes	Very High Risk/ Unsafe
	Ramada resort	>1000MPN/100ml	Yes	Unsafe
	Hospital	>1000MPN/100ml	Yes	Unsafe
	Cocomo Resort	136MPN/100ml	Yes	High Risk/Probably unsafe
	Lagoon 2	>1000MPN/100ml	Yes	Unsafe
January 2020	Pacific Lagoon	136MPN/100ml	Yes	High Risk/Probably Unsafe
	Ramada resort	>1000MPN/100ml	Yes	Unsafe
	Hospital (Poppys on the Lagoon)	483MPN/100ml	Yes	Very High Risk/ Unsafe
	Cocomo Resort	96MPN/100ml	Yes	Intermediate Risk/Possibly Safe
	Lagoon 2	136MPN/ml	Yes	High Risk/Probably Unsafe
February 2020	Pacific Lagoon	>1000MPN/100ml	Yes	Unsafe
	Ramada resort	>1000MPN/100ml	Yes	Unsafe
	Hospital (Poppys on the Lagoon)	>1000MPN/100ml	Yes	Unsafe
	Cocomo Resort	483MPN/100ml	Yes	Very High Risk/Unsafe
	Lagoon 2	326MPN/100ml	Yes	High Risk/Probably Unsafe
March 2020	Pacific Lagoon	136MPN/ml	Yes	High Risk/Probably unsafe
	Ramada resort	483MPN/100MI	Yes	Very High Risk/ Unsafe
	Hospital (Poppys on the Lagoon)	483MPN/100MI	Yes	Very High Risk/ Unsafe
	Cocomo Resort	136MPN/MI	Yes	High Risk/Probably Unsafe
	Lagoon 2	136MPN/MI	Yes	High Risk/Probably Unsafe
April 2020	Pacific Lagoon	136MPN/MI	Yes	High Risk/Probably Unsafe
	Ramada resort	136MPN/MI	Yes	High Risk/Probably Unsafe
	Hospital (Poppys on the Lagoon)	483MPN/100MI	Yes	Very High Risk/ Unsafe
	Cocomo Resort	136MPN/MI	Yes	High Risk/Probably Unsafe
	Lagoon 2	483MPN/100MI	Yes	Very High Risk/ Unsafe

DATE	site	E. coli	Total coliform	Risks
May 2020	Pacific Lagoon	136MPN/MI	Yes	High Risk/Probably Unsafe
	Ramada resort	483MPN/100MI	Yes	Very High Risk/ Unsafe
	Hospital (Poppys on the Lagoon)	483MPN/100MI	Yes	Very High Risk/ Unsafe
	Cocomo Resort	483MPN/100MI	Yes	Very High Risk/ Unsafe
		136MPN/MI	Yes	High Risk/Probably Unsafe

The high bacterial contamination of the five sites in Erakor Lagoon indicates a lot of pressure on the coastal waters due to human activities. There appears to be insufficient flushing of the First and Second lagoons, allowing for elevated bacterial contamination. There is an urgent need to redress this by raising public awareness and educate those residing around Erakor Lagoon on what they can do to reduce the pressure. Proper management of sanitation and water pollution should be prioritised and where feasible explore good engineering solutions to encourage more water movement to flush out contaminants and pollutants from the lagoons.

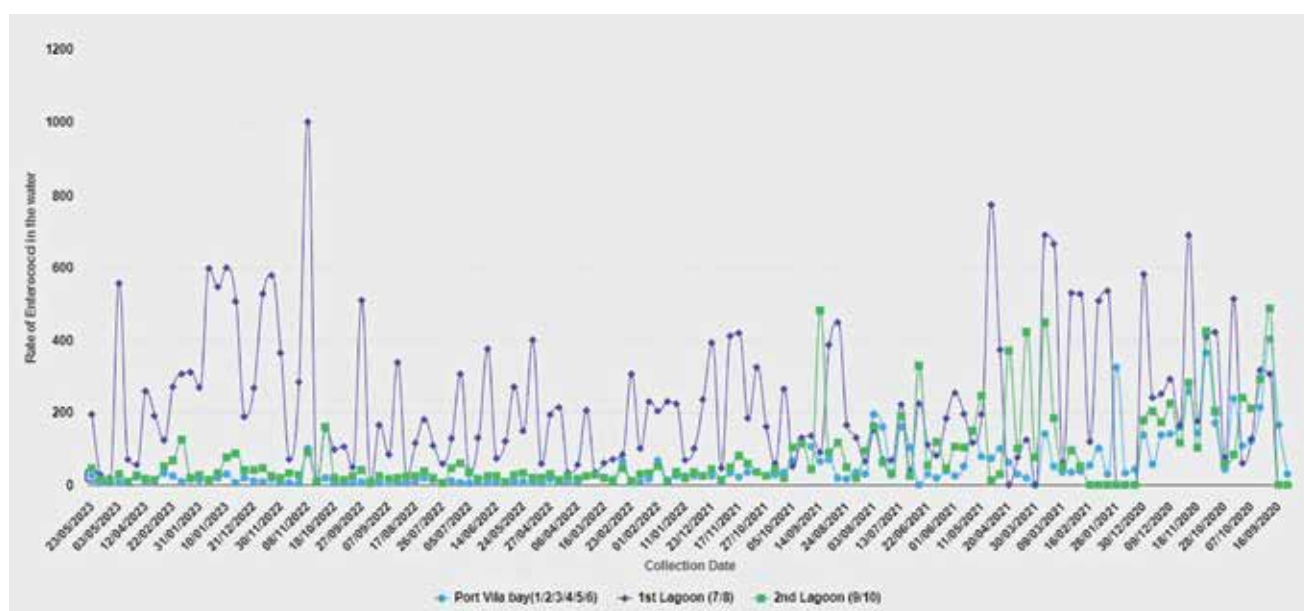


Figure 55: Monitoring results (Coastal Water Quality Database – www.coastalwater.vu)

Impact

The quality of Vanuatu's coastal water continues to deteriorate due to increasing population and a lack of infrastructure to deal with the population pressure (Devlin et al. 2020). Sanitation and wastewater, in particular, is a major concern in Vanuatu, especially the impacts to the tourism industry. Outside of urban centres, water supply systems are either poor or non-existent and water quality is sub-standard and prone to contamination, mostly from human and animal waste (FAO 2016). As a result of the contaminated coastal waters, scabies and skin diseases are common water-related health issues in Vanuatu (Mateo-Sagasta et al. 2017).

Response

The Government recognises the potential hazards posed by contaminated coastal waters and has started a joint monitoring programme with non-governmental organisations and the private sector focusing on waters around Port Vila Harbour, Emten and Ekasufat Lagoon. The programme was designed to provide public awareness on safe and unsafe sites for coastal recreational activities. The information is available to the public via an online platform (Coastal Water Quality Vanuatu Monitoring Program // coastalwater.vu). The programme has informed management decisions including banning of certain areas for swimming, until the situation improves.

The national legislation on water is the Water Resources Management Act providing for a National Water Resources Management Policy and Plan. However, there is no regulation for wastewater management or monitoring (Devlin et al. 2020).

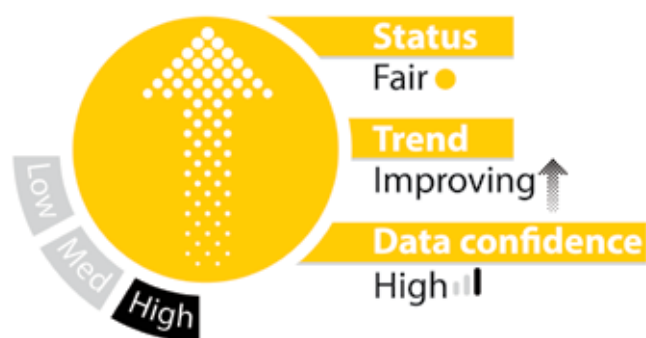
The Environmental Protection Division of DEPC enforces environmental legislation relating to coastal water quality. Specifically the Pollution Control Act provides the legislative framework on pollution of air, land and water. The EP Division is empowered to issue abatement notices and to prosecute offenders if they fail to comply.

Recommendations

A key challenge in resolving the coastal water quality at the Erakor Lagoon is the delay in fixing of the VCH sewage treatment plant. This should be prioritised as a matter of urgent public health.

- Explore options to allow for better tidal flow into the First and Second lagoons, thereby allowing adequate flushing and replenishment of the area with clean ocean water.
- Improve sanitation system within the Port Vila area to avoid any raw sewage from entering the coastal waters.
- Provide adequate support to the Department of Water Resources, Department of Environmental Protection and Conservation and other water agencies to allow them to continue to monitor the coastal water.
- Expand the monitoring systems to priority areas around the country including in other urbanised centres.
- Raise awareness on the importance of protecting and conserving the coastal environment by being mindful on all land-based activities, not only at the public level but within the Government agencies.
- Protection of coastal water must be mainstreamed to all government agencies and business sectors, ensuring that all understand the national policies and the consequences for any breaches.
- Review and where necessary amend the legislation to ensure that businesses and households are taking measures to protect the environment. Also, ensure sufficient resources to implement the legislation.
- Strengthen the existing legislation to ensure that every person (including the Government departments) is accountable to any breaches. Currently, the law does not allow government departments to prosecute one another for non-compliance.

3.3.4 Marine Protected Areas



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS			UNCLOS	SAMOA Pathway 53, 58, 80, 94	National Sustainable Development Plan SOC 1; ENV 4; 5;
			MARPOL	Noumea Convention	Vanuatu's National Strategy for the Development of Statistics
				Pacific Coral Reef Action Plan 2021-2030	NEPIP Objective 2
				Pacific Oceanscape	Standard operating procedures for Community Based Fisheries Management
					Vanuatu National Roadmap for Coastal Fisheries: 2019-2030 Vanuatu National Fisheries Sector Policy 2016-2031

Indicator Definition

Marine conservation areas, marine reserves, marine managed areas or marine protected areas are the various terms used to identify sites that have been declared or demarcated by communities or governments. The objective has primarily been to safeguard natural resources so that they can continue to provide for the people and the future generations. Recently, many of the sites are serving the purpose of providing communities with economic earnings, and as a mitigation measure against climate change. This indicator assesses the number of marine conservation areas and the percentage of the coastal area being protected or managed.

Status and Key Findings

Over the past two decades, local communities have declared tabu areas (see Appendix 7 for a list), and community conservation areas. Some of the community conservation areas are registered with the DEPC under the Environmental Protection and Conservation Act [CAP 283], and others are declared under the Fisheries Regulations. Many others are declared by communities and are not registered with the Government. Those that are registered received legal support to ensure that conservation rules are upheld under the law. There are some gaps on the details of many of the conservation

areas, such as the size of the areas being conserved. The current data (shown in Table 19) show a total of 161 conservation areas registered with the DEPC, of which the majority are marine, 40 are terrestrial and five are terrestrial and inland waters. The total area that is under conservation is 807.72 km² with the land and inland water being the largest, compared to the marine area. The province of Malampa has the largest number of conservation areas at 52, followed by Shefa, Sanma and Penama (Table 19).

A number of network MPAs have been established in Vanuatu, for example, the Nguna-Pele MPA and Tasi Vanua MPA. One of the oldest marine reserves was established under the Fisheries Act 1982 to protect the SS President Coolidge's wreck. The reserve is located on the south coast

of Santo Island and is the largest most accessible wreck dive in the world. It is on the Tentative List under UNESCO's World Heritage Convention.

The CBD's Biodiversity Aichi Target 11 – encouraged Governments to conserve at least 10% of the marine and coastal areas, especially areas of importance for biodiversity and ecosystem services. Based on the efforts of communities, provinces, local organisations and their partners, Vanuatu continues to make progress towards this marine conservation target. The National Environment Policy and Implementation Plan (NEPIP) also had a target of at least 10 Community Conservation Areas to be registered by 2020.

Table 19: Marine area data for Vanuatu. (DPEC Registry 2022)

MARINE AREA (EEZ): 680,000 km²	Coastline: 2,528 km
Land Area: 12,190 km ²	Reef Area: 4,110 km ²
Total official declared sites: 161	Total Area Covered by CCA = 807.72 km ² (0.12%)
Marine CCA = 116	Total Marine CCA: 228.97 km ² (0.03% of EEZ)
Terrestrial CCA = 40	Total Terrestrial CCA: 417.66 km ² (3.43% of land area)
Terrestrial & Inland Water = 5	Total Terrestrial & Inland Water CCA: 161.09 km ² (1.32%)
CCA By Province:	
• Torba – 18 • Sanma – 24 • Penama – 24 • Malampa – 52	

In 2017, Vanuatu realigned its target to 30% of the marine area to be protected based on the international initiative set by SIDS and partners.

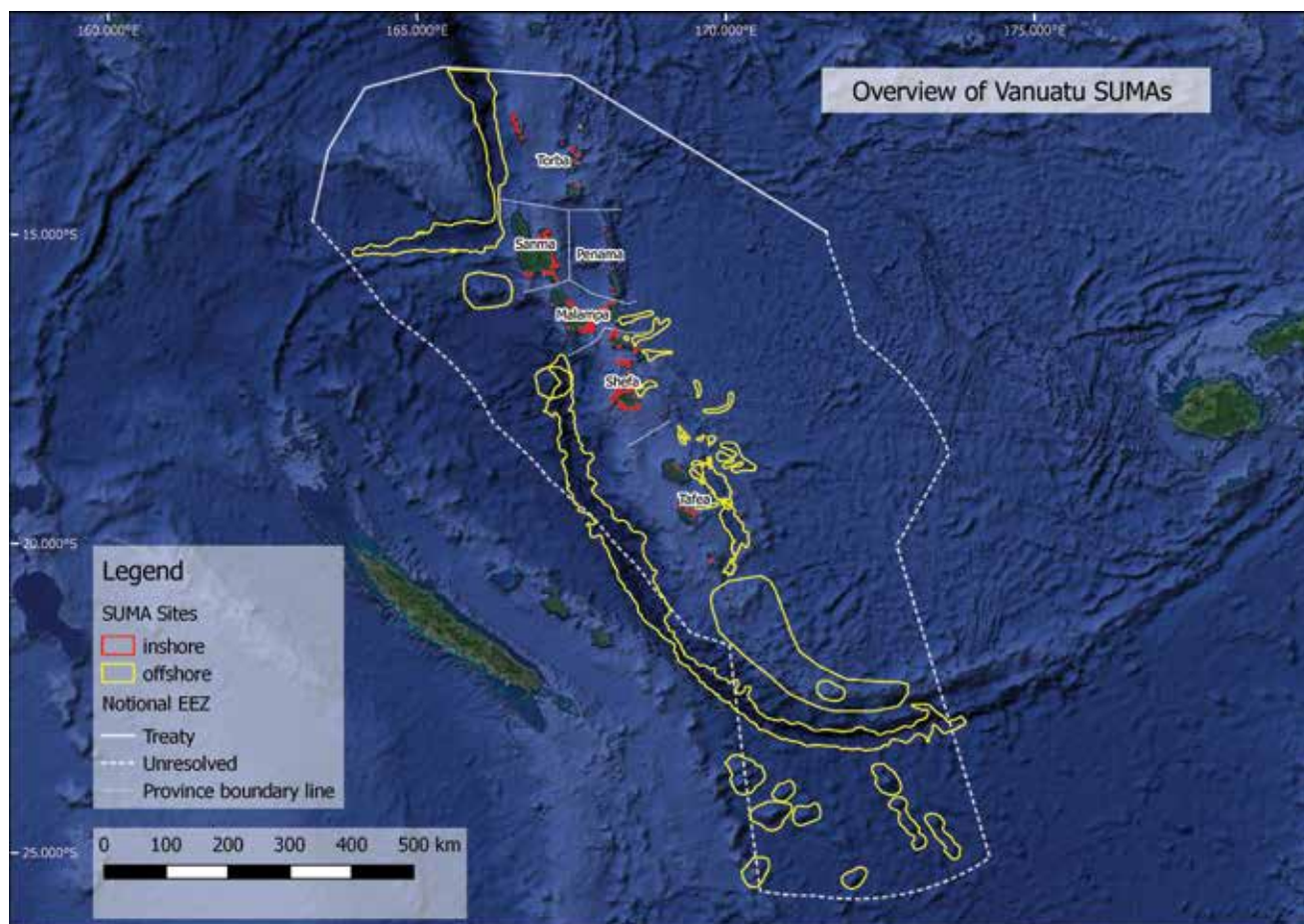


Figure 56: Vanuatu's special underwater marine areas (SUMA). (Source: MACBIO)

Recently, Vanuatu has identified Special and Unique Marine Areas (SUMA) in the inshore and offshore areas (Wendt et al. 2018). These special areas can assist Government in making decisions on how best to use Vanuatu's marine environment, such as for licence and permitting decisions, EIAs and marine protected areas. Ninety-eight inshore and 11 offshore areas were identified in the SUMA process (Figure 56 and Figure 57) (Wendt et al. 2018). Some candidate no-take zones were identified throughout Vanuatu's EEZ.

One of the highlights of Vanuatu's resource management lies with the traditional management system, where community leaders (chiefs) can declare closed seasons, closed areas and size limits in their areas under their control. This is still being practiced and respected in many parts of the country.

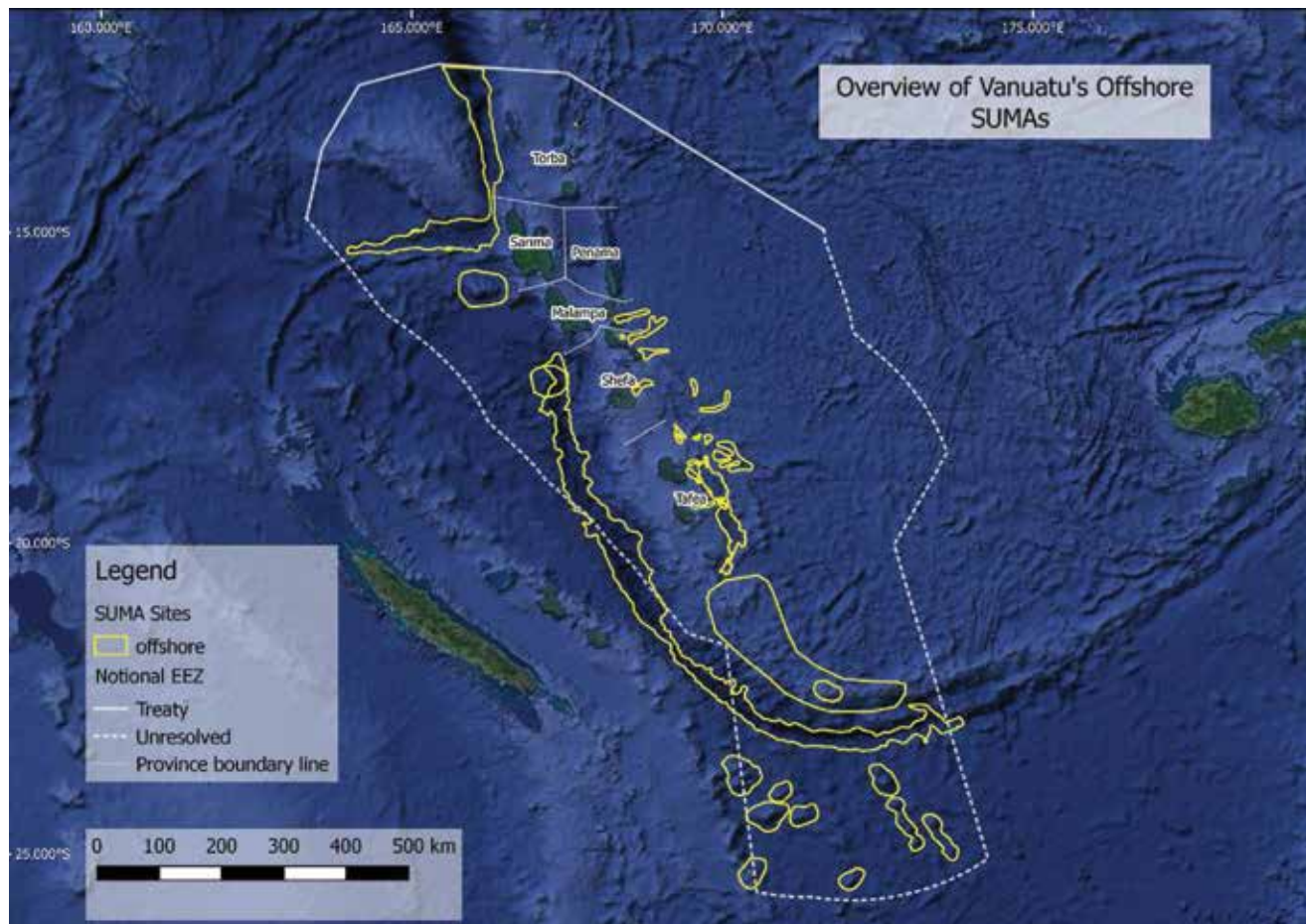


Figure 57: Deepwater bioregions of Vanuatu. (Source: MACBIO)

The no-take zones were identified (Figure 58 and Table 20) during the marine spatial planning, and these will need to be communicated and shared with local communities for their participation.

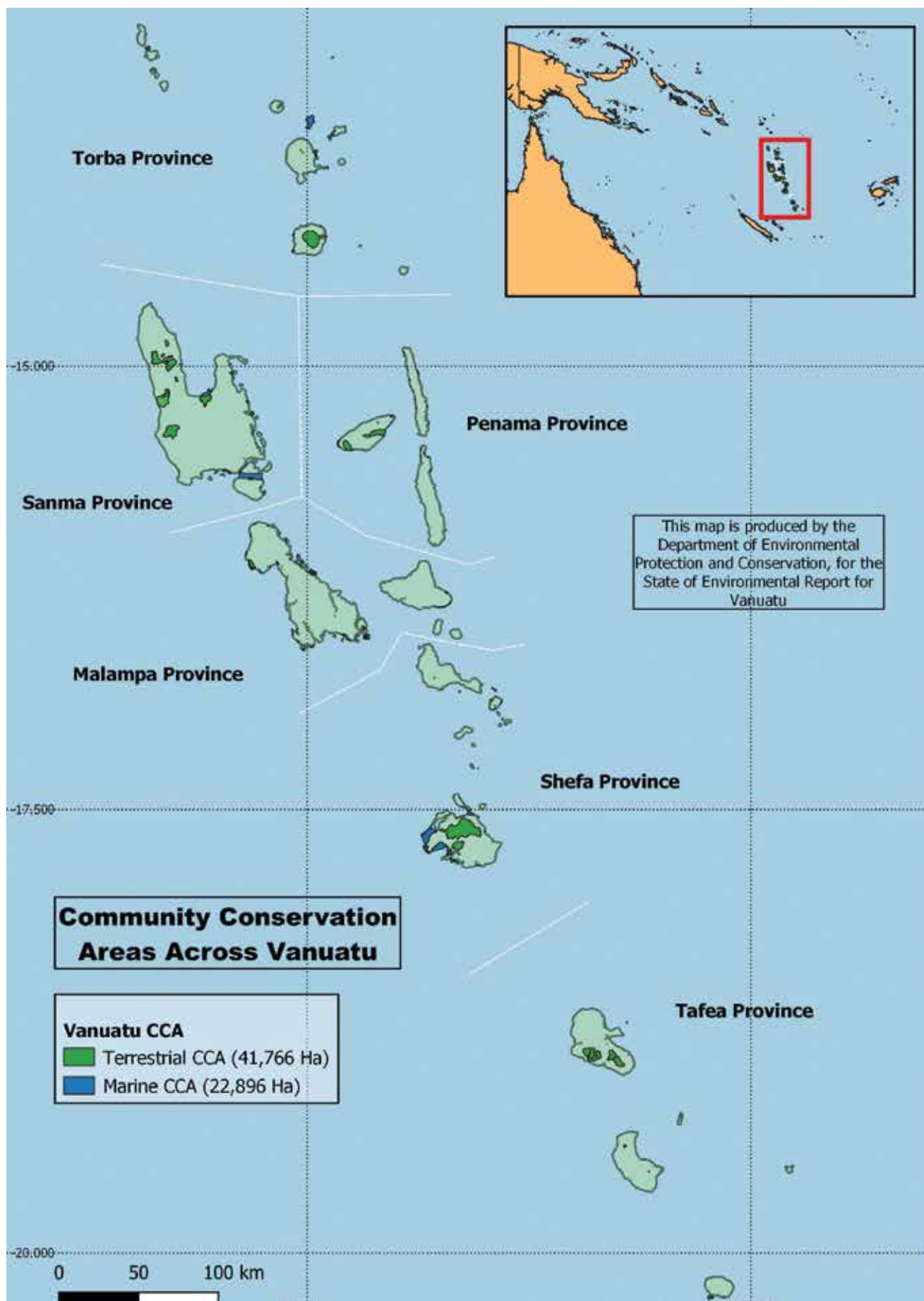


Figure 58: Proposed no-take zones in Vanuatu's EEZs. (DEPC 2022)

Table 20: No-take zones

SITE	Area (km ²)	%
NTZ 1	22.31	0.003
NTZ 2	1287.64	0.159
NTZ 3	49502.06	6.102
NTZ 4	588.31	0.073
NTZ 5	23744.60	2.927
NTZ 6	6422.44	0.792
NTZ 7	188055.69	23.184
TOTAL	269623.05	33.24

Impact

Vanuatu's PA network has an important role to play in terms of biodiversity conservation and provisioning of ecosystem services (particularly safeguarding the fish stocks upon which local livelihoods and food security depend). While Vanuatu has successfully established a network of PAs with both terrestrial and marine components, and compliance with PA regulations appears high, there are gaps in terms of management capacity, monitoring and enforcement. If these are not addressed, the long-term effectiveness of these PAs may be jeopardised.

MPAs and locally managed marine areas (LMMAs) can improve human wellbeing by increasing human resilience to short and long-term threats (thus supporting objectives for community resilience under the National Climate Change Policy) and protecting ecosystems and vulnerable species from ridge to reef, thereby assisting Vanuatu in meeting its commitments under the CBD.

Response

The use of traditional kastom has been a key factor in engaging communities to embrace the drive to protect and conserve marine resources. Traditional conservation has in the past taken the form of tabu, which are now being used by many communities throughout Vanuatu (Govan 2009). There is anecdotal evidence that many of the tabu have been effective with communities reporting larger and more quantity of species. Many of the sites are not formally registered with the DEPC as per the Environment Protection and Conservation Act, but are recognised as tabu areas, marine sanctuary, marine reserve or community protected areas under the Fisheries Regulation Order 28 of 2009, implemented through the Vanuatu Fisheries Department. The VFD have started to collect data from some of the community protected areas. The data from 2019 to 2021 are currently being assessed and there is evidence of the effectiveness of some of the tabu areas (Sokach pers comm. 2022).

Vanuatu has made great progress in improving knowledge on the marine environment through research and collaborations with local and international partners. The results of these initiatives have led to the development of national policies relating to the sustainable ocean use and management.

One of the key national documents is the National Ocean Policy 2016, which captures the aspirations of the country and its relationship with the ocean. The preservation and protection of the marine environment is a key objective under the Ocean Policy. The Marine Protected Areas section of the National Ocean Policy obligates the government's commitment to establish well-managed, ecologically representative networks of MPAs in Vanuatu waters. The ambitious plan of a representative network of MPAs by 2020 continues to be an important driver for the key partners, and some work has contributed to realising this (e.g. Nguna-Pele network marine conservation areas).

Recommendations

- Vanuatu's National Ocean Policy 2016 outlines actions in the Marine Protected Area realm. These policy actions need to be fully implemented, as the outcome will benefit Vanuatu's future generations.
- The National Conservation Area Registry is an important tool for the country that needs to be adapted to suit the aspirations of the communities, and be workable for those that are overseeing it. There is an unfortunate perception that registering CCA under the National Registry is not beneficial due to 'additional bureaucracy' for communities. This needs to be addressed urgently, so that the system is transparent and clear for communities to consider. The information gathered from the Registry will allow the Government to seek and secure resources and assist with reporting to national, regional and international targets.
- Foster closer working relationships and coordination at the national level to better support community resource management efforts.

- Build and enhance the capacity of government and provincial staff, traditional leaders and community to undertake actions such as resource monitoring, reporting and educating others. This will require resources, especially equipment and financial, as well as the buy-in by traditional and community leaders.
- Clearly demarcate the protected area boundaries and provide signage. This will support understanding of where the conservation area is and hence, assist with compliance and enforcement efforts.
- Formulate a national level classification or categorisation system suitable for Vanuatu's community conservation area scheme, in consultation with all relevant stakeholders.
- Support the work of VFD, DEPC and others to assist communities in monitoring their marine conservation areas.
- The role of the Tourism sector in supporting marine conservation areas needs to be explored, especially through sustainable and eco-friendly tourism operations.
- Encourage the sharing of accurate data on MPA coverage and management programmes to ensure that this is reflected in global databases, such as the World Database on Protected Areas.

Marine and Coast References

Asian Development Bank (ADB). 2000. Vanuatu: Agriculture and Fisheries Sector Overview. Pacific Study Series

Chin, A., Lison de Loma, T., Reyntar, K., Planes, S., Gerhardt, K., Clua, E., Burke, L., Wilkinson, C. 2011. Status of Coral Reefs of the Pacific and Outlook: 2011. Global Coral Reef Monitoring Network. 260p.

Cillaurren, H., David, G., & Grandperrin, R. 2018. Coastal Fisheries Atlas of Vanuatu. Village subsistence fishing. Subsistence village fisheries. IRD Publishing. pp. 69-115.

Department of Fisheries, 2018. Annual Report. Port Vila, Vanuatu.

Devlin, M., Smith, A.J., Graves, C.A., Petus, C., Tacey, D., Maniel, M., Hooper, E., Kotra, K., Samie, E., Loubser, D., & Lyons, B.P., 2020. Baseline assessment of coastal water quality in Vanuatu, South Pacific: insights gained from in-situ sampling. Marine Pollution Bulletin. 160

Done, T.J., & Navin, K.F. 1990. Vanuatu Marine Resources: Report of a biological survey. Australian Institute of Marine Science, Townsville, Australia. 272p.

FAO, 2016. AQUASTAT – FAO's global information system on water and agriculture. <https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/VUT/index.html>

FAO, 2022. Vanuatu. Text by Teemu Viinikainen. Fisheries and Aquaculture Division [online]. Rome. [Cited Tuesday, June 7th 2022]. <https://www.fao.org/fishery/en/legalframework/vu/en>

Hickey, F.R. ND. Strengthening Fisheries Management in Vanuatu – Keys to achieving Millennium Development Goals. Vanuatu Cultural Centre. Port Vila, Vanuatu. 2p.

Johnson, J., Hooper, E., Dwyer, S., Waterhouse, J., & Kaltavara, J. 2019. Republic of Vanuatu. In Status and Trends of Coral Reefs of the Pacific. Moritz, C., Vii, J., Lee-Long, W., Tamelander, J., Thomassin, A., & Planes, S. (Eds). Global Coral Reef Monitoring Network. 221p.

Johnson, J.E., Waterhouse, J., Devlin M.J., & Hooper, E. 2016. Marine Ecosystem Assessment: North Efate, Vanuatu. Report to the Pacific Community (SPC), Noumea, New Caledonia, and Agence Francaise de Developpement, Paris, France. Vanuatu RESCCUE project, 20p.

Kanas, C. 2019. Port Vila Coastal Water Quality Monitoring Program. Department of Water Resources. Vanuatu. 13p.

Mackey, B., Ware, D., Nalau, J., Sahin, O., Fleming, C.M., Smart, J., Connolly, R., Hallgren, W. and A. Buckwell, 2017, Vanuatu Ecosystem and Socio-economic Resilience Analysis and Mapping (ESRAM), Secretariat of the Pacific Regional Environment Programme (SPREP), Apia, Samoa.

Matariki, G. 2020. Port Vila Harbour and Nambatu Lagoon Coastal Water Quality Monitoring Program. Department of Water Resources. December 2020 Report. Vanuatu. 13p.

- Mateo-Sagasta, J., Zadeh, S.M., & Tural, H. 2017. Water pollution from agriculture: a global review. In: Food and Agriculture Organization of the United Nations Rome, a.t.I.W.M.I.o.b.o.t.W.L.a.E.r.p.C, (Colombo).
- Muldoon, J., Dovo, A., & Fernandes, L. 2015. Review of legislation, policies, strategies and plans relating to the use and management of Vanuatu's oceans. Report to the Government of Vanuatu. MACBIO (GIZ, IUCN, SPREP), Suva.
- Naviti, W., & Aston, J. 2000. Status of coral reef and reef fish resources of Vanuatu. SPREP. 20p.
- Pakoa, KM. 2007. Vanuatu, in Status of Coral Reefs in the South West Pacific 2004. R. Sulu (Ed), IPS Publications, University of South Pacific, Fiji.
- Sammy, E. 2021. Personal Communication. April. 3. 2021. Reported by Anita Roberts in Daily Post Digital Network. Harbour swimming ban lifted – other areas off limits.
- Vanuatu Department of Fisheries (VDF), 2017. Vanuatu National Fisheries Sector Policy 2016-2031. Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. Government of Vanuatu.
- Vanuatu Department of Fisheries (VDF), 2019. Vanuatu National Roadmap for Coastal Fisheries: 2019-2030. Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. Port Vila, Vanuatu. 24p.
- Verdone, M., & Seidl, A. 2012. Fishing and Tourism in the Vanuatu Economy. Gland, Switzerland: IUCN. 20p.
- Wendt, H., Beger, M., Sullivan, J., LeGrand, J., Davey K, Yakub N, Kirmani SN, Grice H, Mason C, Raubani J, Lewis A, Jupiter S, Molisa V, Ceccarelli D, Fernandes, L. 2018. Marine bioregions of Vanuatu. MACBIO (GIZ, IUCN, SPREP), Suva, Fiji. 60 pp.

THEME 4:

BIODIVERSITY



Image source: Dubi Shapiro (DEPC)

Biodiversity Overview and Highlights



James Cook's landing at Tanna island c. 1774.
(National Maritime Museum, Greenwich, London CC-BY-NC-SA-3.0)

The scientific knowledge on Vanuatu's biological diversity has been a slow process that began with a passing observation made by the Spaniards in 1606, followed by Johann Forster on board James Cook's HMS Resolution ship (1772-1775), who made the first major botanical collections of Vanuatu (Corbara and de Forges 2011). Philibert Commerson, the French botanist, collected specimens during a visit by Louis Antoine de Bougainville (1766-1769). The Whitney South Sea Expedition (1920-1932) was the first major focus on Vanuatu's fauna, with specimens collected for the American Museum of Natural History. Another important expedition to Vanuatu was the Oxford University Expedition to the New Hebrides (1933-1934), led by zoologist John Baker with one of its aims to study the breeding seasons of Vanuatu animals. Many bats, birds and lizards were sacrificed for his research (Corbara and de Forges 2011). The Royal Society-Percy Sladen Expedition (1971) led by K.E. Lee from the Australian Commonwealth Scientific and Research Organisation (CSIRO), engaged scientists from seven countries. Much of Vanuatu's terrestrial fauna was studied including the flora, phytogeography, vertebrates and invertebrates. The work by Lee and colleagues has helped improve knowledge on the species diversity of the country. The Tsukuba Botanical Garden, National Science Museum Expeditions (1996-2001) under the direction of Tsukasa Iwashina focused on botanical surveys with a strong engagement of local staff from the Environment Unit and Department of Forestry. The results of the work is published titled 'Contributions to the Flora of Vanuatu (Vol 1 and 2). Another notable expedition was the deep-sea marine biodiversity surveys, which was led by the

French. The deep-water fauna was sampled between 100 to 1500 m depths. The results of the northern part of the island were unique and led to a new scientific programme on sunken wood being developed (Cobara and de Forges 2011). In 2006 a biodiversity survey focussed exclusively on Santo was undertaken, and it is considered one of the largest expeditions conducted so far.

From 2002 to 2010, studies were undertaken on the islands on freshwater systems identifying species of fishes and crustaceans resulting in the publication (Keith et al. 2010). Rapid biodiversity assessments (BIORAPs) were also undertaken in Butmas and Nabauk (South Santos), Amal Crab Bay (North-east Malekula), Ertap (South Efate), Efate Land Management Area, Erromango Kaur Reserve, Bay Homo (South Pentecost), Gaua Lake Letas, Mouth Tabwemasana (west Santo), Loru (East Santo) and Malekula (Rolenas pers comm.).

Vanuatu's biodiversity reflects classic island biogeography, where island size and distance from a continental source are key determinants of species diversity and numbers. The larger and older islands generally support a greater diversity of terrestrial ecosystems, and a greater diversity of plants and animals. The islands are separated by the sea, and catchments and lowland habitats are separated by mountains: these are barriers to many species, and they provide conditions whereby relatively rapid sub-speciation and speciation can occur. Altitudinal gradients provide opportunities for montane endemics, such as the Mountain Starling (*Aplonis santovestris*) of Santo, which

add diversity to high island faunas that is not possible on low islands. Frequent disturbances due to tropical cyclones, earthquakes and volcanic activity also affect the distribution and abundance of species, especially on the smaller islands. There is significant variation with latitude, with species that occur at high altitudes in the tropical north occurring at much lower altitudes in the sub-tropical south. Consequently, there is considerable variation in the distribution of species within and between islands, and Vanuatu's biodiversity is of particular interest for its on-going processes of immigration, range extension and contraction, and sub-speciation (DEPC 2014).

Internally there is a biogeographic divide with islands to the north of Efate demonstrating significant differences to the islands to the south. Vanuatu's reef ecosystems support similar species to Australia's Great Barrier Reef and New Caledonia. In general, knowledge in Vanuatu's biodiversity continues to be improved.

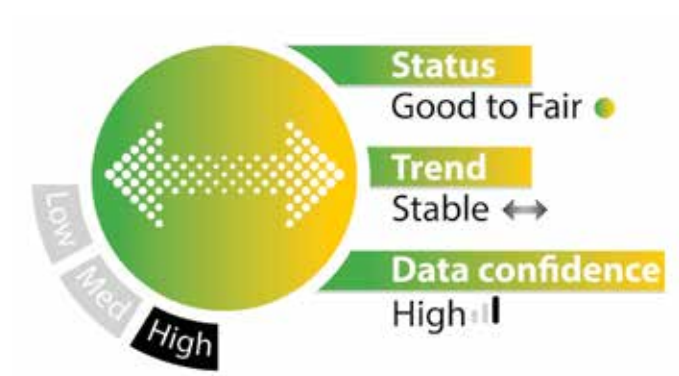
Vanuatu has 27 Key Biodiversity Areas identified under the East Melanesia Ecosystem Hotspot profiling (CEPF 2012). Two sites (Aneityum and Santo Mountain Chain) are considered of highest priority for conservation due to the presence of a Critically Endangered or Endangered species.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
IUCN Red List		The number of species found in Vanuatu continues to be assessed under the IUCN Red List process. Those that have been assessed fall into all of the Red List categories, including extinct species, and species that are critically endangered, endangered, vulnerable or highly threatened. There are also many species with very little information known about their population and ecology. Some may already be vulnerable or threatened. Research and surveys of many islands and sites reveal new records or new species. Archaeological surveys are also finding some species are no longer found.	The Government, communities and non-governmental organisations are working together towards the protection and conservation of many of Vanuatu's native species. Recommendations More research, surveys and monitoring of priority species to assess their population status and identify key threats that will need to be managed. Encourage research into cryptic biodiversity groups (e.g. terrestrial invertebrates, and freshwater biodiversity), as they are key components of Vanuatu's ecosystem. Encourage all organisations and institutes to engage with DEPC on all matters relating to biodiversity and environmental research, so that results are compiled and assist the country in managing the natural resources. A copy of all publications from research of Vanuatu's biodiversity to be deposited with DEPC. Continue to work with communities and local organisations to protect and conserve native species through the designation of community conservation areas, or similar management programs.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Wetlands		Vanuatu's wetlands are unique, such as Lake Letas on Gaua, considered the second largest freshwater lake in the Pacific. Its high elevation and within an active volcano makes this lake truly remarkable. It is the largest volcanic lake, outside of Papua New Guinea. The wetlands include rivers, lakes, streams, mangroves, seagrass and coral reefs. The mangrove forests are one of the largest in the Pacific. Threats to mangrove forests are attributed to lease encroachment, unregulated developments and to a smaller extent the harvesting of mangroves for firewood. Cyclones and other extreme weather events (droughts, storm surges and prolonged exposure during heat waves) have also threatened mangrove forests.	Vanuatu has developed a National Wetland Inventory (Kalfatak and Jaensch 2014). Wetlands have been safeguarded under the National Parks Act and the Environmental Protection and Conservation Act, implemented by the Department of Environmental Protection and Conservation. Wetlands in the marine environment, including coral reefs and seagrass beds fall within the management of the Fisheries Act. The Fisheries Department work closely with communities to set up conservation areas that include marine related wetlands. Recommendations To conduct more research, surveys and monitoring of the country's wetlands, specifically the species living within the wetlands, and those associated with wetlands. Use the Vanuatu National Data Portal to store research outcomes (including all published reports) and survey data so that the National Wetland Registry remains up-to-date.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Environmental invasive species		Invasive species remain one of the leading causes of extinction for many island species (e.g. Tanna Ground Dove). Vanuatu has many invasive species of concern including 27 of those listed in the World's Worst 100 invasive species. The two ant species (Yellow Crazy Ant and the Little Fire Ant) are particularly of concern. The <i>Merremia peltata</i> is of concern as they affect forests.	A national arrangement is in place, whereby DEPC and Biosecurity vet any new introductions into the country. Vanuatu has developed its National Invasive Species Strategy and Action Plan (NISSAP), listing 27 priority invasive species, which are also included in the World's Worst 100 invasive species, and infested sites to be managed. A number of projects have been undertaken to address the priority invasive species. A National Invasive Species Technical Advisory Committee was established comprising of staff from various Government departments, NGOs (e.g. Live & Learn) and Civil Society. Recommendations There is a serious need to provide more resources, especially financially to help address and manage Vanuatu's priority invasive species and infested sites. Adopt the revised NISSAP and secure resources for its implementation. Continue to engage and raise awareness of communities on the harmful impact of invasive species. Revitalise and support the National Invasive Species Technical Advisory Committee (NISTAC) to continue to guide the management and response of the country in addressing invasive species.
Conservation and protected areas		Vanuatu has set targets for establishing protected and conservation areas. Many local communities have declared tabu sites, where they are able to exercise their traditional management practices. Although, many of the community conservation sites need to have management plans prepared and delimitation surveys undertaken.	National legislation has been enacted to support declaration of community conservation areas. National policies, such as the National Environmental Policy and Implementation Plan (NEPIP), and the NBSAP, have also been developed and are being implemented with the National Sustainable Development Plan as the guiding policy. Recommendation To continue to promote the protection and conservation of Vanuatu's natural resources. In particular working with communities to support and empower their management of their resources.

3.4.1. IUCN Red List Species



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 15.5A, 15.7, 15.C	 	SAMOA Pathway 90, 94(d)	National Sustainable Development Plan ENV 4; 5 National Environmental Policy & Implementation Plan Objective 2

Indicator Definition

The state of Vanuatu's fauna and flora is assessed under the IUCN Red List criteria. It is acknowledged that Vanuatu has its own list of species that are important from a national and local perspective. These species included those that are used for traditional and cultural purposes. Many of these species are yet to be assessed and included in the IUCN Red List.

Status and Key Findings

A total of 2338 species reported from Vanuatu have been assessed under the IUCN, of which 2171 are animals and 167 plants (DOPA – <https://www.dopa-explorer.jrc.ec.europa.eu/country/VU>). The assessment is showing that many of the species are at risk, especially those that are endemic or have narrow distribution within the country.

Vanuatu Species Summary

Number of Species = 2146 (Rank: 86)

Number of Endemic Species = 13 (Rank: 60)

Number of Threatened Species = 16 (Rank 154)

Number of Threatened Endemic Species = 5 (Rank 60)

Information source: <https://www.dopa-explorer.jrc.ec.europa.eu>

Extinct and Extirpated species

Vanuatu has recorded a number of extinctions including a Porzana rail and Eclectus parrot from Malekula, a flightless rail (*Gallirallus* sp.) from Toga Island, a megapode (*Megapodius* sp.) and a hawk (*Acipiter cf. fasciatus*) from Efate (Steadman 2006; Worthy et al. 2015), and the Tanna Ground-dove (*Alopecoenas ferrugineus*) (Stresemann 1950). Early extinctions have been attributed to exploitation by early settlers (Steadman 2006); whereas invasive species, together with small-scale commercial agriculture, slash and burn to clear land to grow kava, and unregulated developments are now the main cause of species extinction.

Critically Endangered species

Seven species found in Vanuatu are listed as Critically Endangered in the IUCN Red List. Two of the species (Beck's Petrel and Hawksbill Turtle) have a region-wide distribution, the Oceanic Whitetip Shark has a global distribution and the other four species are native/endemic to Vanuatu. The Vanuatu aralia shrub, *Plerandra vanuatu*, is endemic to Aneityum Island (Lowry et al. 2013).

Table 21: A list of Critically Endangered species assessed for Vanuatu. (IUCN Red List 2022)

VANUATU'S CRITICALLY ENDANGERED SPECIES
Beck's Petrel (<i>Pseudobulweria becki</i>)
Hawksbill Turtle (<i>Ertmochelys imbricata</i>)
Oceanic Whitetip Shark (<i>Carcharhinus longimanus</i>)
<i>Carpoxydon macrospermum</i>
Snake Palm (<i>Caryota ophiopellis</i>)
Niuniu Tatu (<i>Neoveitchia brunnea</i>)
<i>Plerandra vanuatu</i>

Species Highlight: *Neoveitchia brunnea*

Niuniu Tatu | Devil Palm



The Devil Palm is a highly range-restricted tree species endemic to the northern quarter of the island of Pentecost, where native forests are highly threatened. A recent assessment by the Plants mo Pipol blong Vanuatu project has determined that this species is Critically Endangered (CR), and it is now listed as such on the IUCN Red List (see Plunkett 2021; IUCN Red List 2022). This species is known as Niuniu Tatu in the Raga (Hano) language of North Pentecost. It is a sub canopy rainforest palm tree ranging 6–10 m in height (Dowe and Cabalion 1996). A survey conducted by the Vanuatu Department of Forestry found fewer than 30 wild-growing adult plants in native stands (see Dovo 2022), all restricted to small, highly fragmented forest stands or wood lots, and none of which are found in effectively protected conservation areas. Principal threats to this species include habitat destruction, which is accelerating rapidly (especially due to

commercialized agriculture for kava, and to large tabu gardens associated with grade-taking ceremonies). Moreover, traditional (kastom) beliefs hold that contact with or proximity to the species can cause illness or death, and there are reports that the species has been actively eradicated from some areas. In December 2021, the Department of Forestry initiated programmes to educate local people about the uniqueness of this species and its potential extinction in the wild, but these efforts should continue and be intensified. To date, the species has not been subject to any in situ or ex situ conservation efforts. What is important is the need to establish protected sites where the species grow and to promote propagation and planting.

IMAGE (C) NAIJA PALM TREES

Endangered species

Thirty-four species are listed in the IUCN Red List Endangered category, of which the majority are animals (29 species) and the other five are plants. Eight of the species are endemic to Vanuatu (Table 22), whereas others are found in Vanuatu and neighbouring islands (e.g. the introduced and naturalised *Brachylophus bulabula* – Fijian Banded Iguana and *Alopecoenas sanctaecrucis* Santa Cruz Ground Dove – also found in Santa Cruz of the Solomon Islands). Nineteen of the endangered species are marine and 15 are terrestrial, which includes plants, two snails, three bats, three birds and two reptiles (See ANNEX 5 – Vanuatu’s Endangered Species). Some of Vanuatu’s iconic endangered species include the following:

Table 22: Vanuatu’s IUCN Red List Endangered species. (IUCN Red List 2022)

<i>Chaerephon bregullae</i> Fijian mastiff bat 	Endemic to two islands in Vanuatu and two islands in Fiji. It has been extirpated from Tonga. It is restricted to a cave in Vanua Levu (Fiji) with a few thousand individuals. A recent biodiversity assessment conducted in Malaklolop Conservation Area at Dolav, Gaua Island in October 2018 confirmed the existence of the species at a coastal cave (Kalfatak pers. comm.).
--	---

<i>Emoia aneityumensis</i> Anatom skink 	Found mainly in rainforest to dry coastal forests on Aneityum island. It is closely related to another local species <i>E. erronan</i> (see Brown 1991). The species was first described in 1974 from two locations at Aneityum Island. The main threat is habitat degradation due to agriculture expansion and logging (IUCN Red List 2022). A recent survey by EDA in 2021 found 62 individuals with the highest number found on the northern part of the island (Tavue Baereleo pers. comm.). Local knowledge and observation confirms the species was common but recently declined possibly due to habitat change. The local name is Namapmap (due to it being found close to Tahitian Chestnut trees). Locals also observed the species to be found in swampy-forested areas. The Aneityum chiefs through the conservation of the Aneityum's Key Biodiversity Area have reinforced the protection for the species.
<i>Partula auraniana</i> Aore's snail 	Found on 'Aura (sic) Island' (Aore Island) in the Malo Pass, Santo. No information known on its population. Note the species epithet honours the type locality Aore Island, which was misspelt as Aura Island in the original species description of Hartman (1888).
<i>Ouagapia perryi</i> Perry's snail	Ground-dwelling and carnivorous land snail recorded from lowland moist forest. It was assessed for the IUCN Red List by Barker in 2011. The species has been recorded from 3 sites in Vanuatu. Species continue to decline with invasive species and habitat degradation as key threats.
<i>Cyphosperma voutmelense</i> Voutmele palm 	Endemic and is threatened by habitat loss. Restricted on Santo (Cumberland peninsula). This palm is endemic to the mountainous chain in western Santo, occurring primarily in the undergrowth of humid forests, where it grows in small colonies, generally above 900 m elevation, and is often abundant (see "Principal Types of Vegetation Occurring on Santo"). A few populations are found in open areas, where the plants exhibit a more prostrate habit. Individuals of <i>C. voutmelense</i> are relatively small, reaching a maximum height of about 6 m. The fruits, which are about 1 cm long and olive-shaped, are well known in north-western Santo for their medicinal properties, in particular as a treatment for certain types of fever.

<i>Veitchia montgomeryana</i> (= <i>V. arecina</i>) Montgomery palm 	This species is found only in Vanuatu. It is threatened by habitat loss but efforts to plant more palms is now helping in securing its future. It is now well cultivated as an ornamental plant. <i>Veitchia montgomeryana</i> is one of four endemic species in Vanuatu. The genus <i>Veitchia</i> is restricted to Vanuatu, Fiji and Tonga.
<i>Aplonis santovestris</i> Santos Mountain starling 	The bird is found in cloud forests in the Santo Mountain Range at 1270 m above sea level. Its distribution is noted to be restricted. Locals noted the bird being commonly seen in the 1960-1970s but it is now very rare. According to the IUCN Red List the population estimate is less than 1000 mature individuals, however, the actual number is much smaller given the paucity of recent records and its restriction to an extremely small area of the mountaintops (BirdLife International 2022; Baereleo pers. comm. 2022). Only two recent sightings in 2021 on the slopes of Mt Tabwemasana. Its biology, ecology and population remain poorly known and additional research is needed to resolve this. Local communities that reside within the range of the bird have agreed to establish a network of community conservation areas to protect the bird as well as other unique biodiversity within the Santo Mountain Range.
<i>Alopecoenas sanctaecrucis</i> Santa Cruz Ground dove 	This ground-dove remains extremely poorly known. It is precautionarily classified as Endangered, based on the assumption of recent cyclonic events, its population is very small and suspected to be declining further. Two individuals were observed during a Mount Tabwemasana Rapid Biodiversity Assessment conducted in 2018 (Kalfatak pers. comm). However, as the population size is only an estimate, and no data on the rate of decline are currently available, the species might warrant further listing when clearer re-assessment becomes possible. The population is estimated at 213-1070 individuals and decreasing (BirdLife 2022).

Vulnerable species

There are 127 species listed as Vulnerable under the IUCN Red List (ANNEX 6 – Vanuatu's Vulnerable Species). The majority of the vulnerable species are corals (61%), followed by fishes (17%), birds (6%), marine invertebrates (5%) and plants (5%) (Figure 59, Table 23). Only a few (7) of the Vulnerable species assessed are endemic to Vanuatu, or only found in Vanuatu and a few other neighbouring islands (Fiji, Solomon Islands, New Caledonia and PNG). The majority of the endemic species are terrestrial. The key threats for many of the IUCN Red List Vulnerable marine species are the crown-of-thorns starfish and high sea surface temperatures for corals, and over-fishing for some of the invertebrates and fishes. For Vulnerable terrestrial species, invasive species predation on birds is a leading threat, and habitat loss from small scale commercial agriculture, slash and burn techniques particularly for kava farms, unregulated infrastructure development (Baereleo pers comm. 2022), natural disasters and the ornamental trade contribute to the threats of many plants (IUCN Red List 2022). The number of vulnerable species is likely to increase, as more research on Vanuatu's species and their population is undertaken.

Species Highlight: *Gehyra georgpotthasti* – Web-toed gecko



A forest specialist but can also be found in disturbed habitats. The species is at particular risk from logging and forest clearance, especially on the three large islands Espiritu Santo, Pentecost and Malakula. Recent records of the Web-toed gecko exist only for remote areas of high-elevation forest with limited road access. It has not been recorded from Epi since 1974. No reliable records exist for Efate or Erromango, although it is possible that the species occurred here historically, no remaining native forest exists on Efate, while Erromango is a major centre of logging operations. This species continues to be a food source for some communities. Locals have noted that the species is becoming difficult to find.

DEPC. Image source: CCA 3.0 (Flecks et al. 2012)

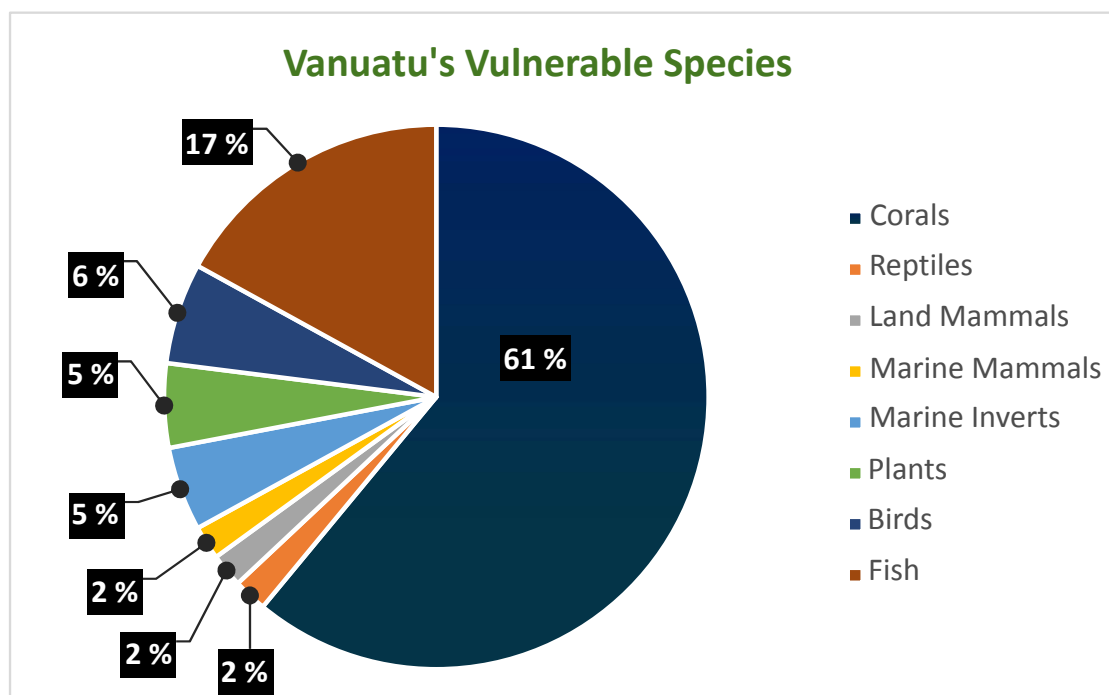


Figure 59: Vanuatu's IUCN Red List Vulnerable species into broad categories (IUCN 2022)

Table 23: Vanuatu's IUCN Red List Vulnerable species categorise into broad biodiversity groups. (IUCN 2022)

BIODIVERSITY GROUP	NUMBER OF SPECIES
Birds (residents and seabirds)	8
Marine invertebrates (holothurian, crab and clams)	7
Reptiles	2
Marine mammals (dugong, whale)	2
Land mammals (bats)	2
Corals	78
Plants	6
Fish	22
Total	127

Lower Risk: Conservation Dependent

Four Vanuatu species are categorised as Lower Risk/Conservation Dependent. Three are giant clams (*Tridacna squamosa*, *T. maxima* and *Hippopus hippopus*) and a palm tree (*Veitchia metiti*) (IUCN Red List 2022).

Near Threatened

The number of species for Vanuatu that has been assessed and found to be Near Threatened is 148. Only one is exclusively a freshwater species – an Ai's goby (*Sicyopterus aiensis*), 13 are exclusively terrestrial. One species, a damselfly (*Indolestes cheesmanae*), is found in both the terrestrial and freshwater environs. Three are found in all the three environments - terrestrial/freshwater/marine. Eight species are found in both the terrestrial and marine environments – seven are seabirds and one is a sea-snake (IUCN 2022).

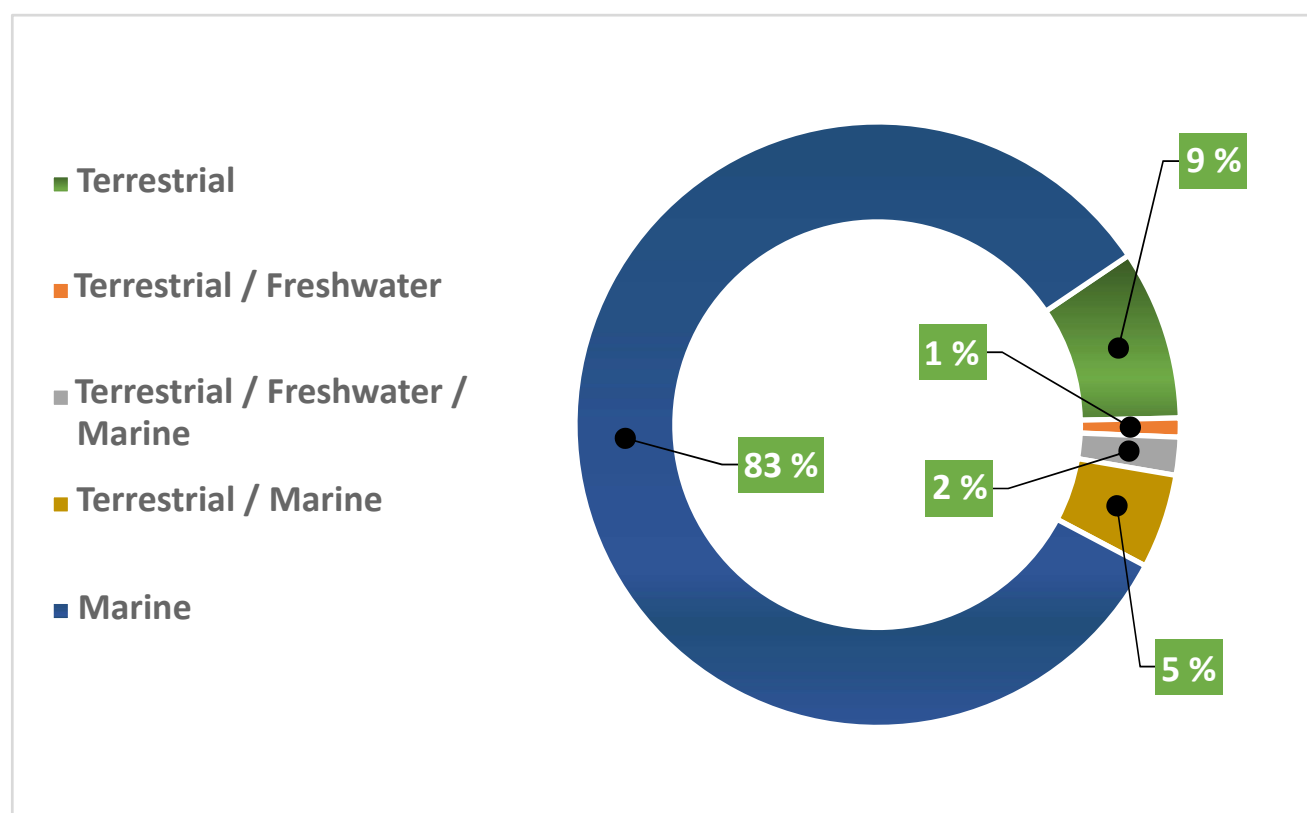


Figure 60: Vanuatu's Threatened species and their main habitats. (IUCN 2022)

Avifauna

Ornithological exploration of the New Hebrides began on Captain Cook's second voyage in 1774. Of the twenty-three subsequent explorations, the most extensive were by the Layards in 1877-1879, Baker in 1922-1927, the Whitney South Sea Expedition in 1926-1927, an Oxford University Expedition in 1933-1934, MacMillan in 1935-1937, Bregulla during over a decade of residence since the 1960's, and the Royal Society-Percy Sladen Expedition in 1971 (Diamond and Marshall 1977). A guide to the birds of Vanuatu by Heinrich Bregulla was published in 1992 and remains one of the key avifauna references for the country (Bregulla 1992). These surveys have improved the knowledge of birds in Vanuatu. Vanuatu's birds are likely to have come from Australia possibly via New Caledonia and from New Guinea via the Solomon Islands, with a minor route from Fiji. Many records of birds in Vanuatu have also come from bird watchers and bird enthusiasts, which are reported in various online forums, such as the Avibase – The World Bird Database (<https://avibase.bsc-eoc.org/checklist.jsp?region=VU>) and Birdlife International. Denis Lepage provides the information below from the World Bird Database.

VANUATU AVIFAUNA PROFILE	
187 bird species	
56 resident birds	
1 endemic genus (Buff-bellied Monarch)	
4 endemic full species	
5 endemic allospecies	
24 endemic subspecies	
22 native species	
14 introduced species (Jungle fowl, Common Mynah, Chestnut Munia, Rock Pigeon, Red-vented Bulbul, Jungle Mynah, House Sparrow, Common Waxbill, Chestnut-breasted Munia, Red Avadavat, European Starling, Mallard, Red-browed Firetail, Red-throated Parrot finch)	
By Province:	
Torba – 114 species	
Shefa – 144 species	
Tafea – 138 species	
Sanma – 130 species	
Penama – 105 species	
Malampa – 120 species	

Avibase – The World Bird Database (<https://avibase.bsc-eoc.org/checklist.jsp?region=VU> **)**

Among the native birds, ten are on the IUCN Red List: Santa Cruz Ground-Dove (Endangered); Vanuatu Megapode, Baker's Imperial Pigeon (Vanuatu Mountain Pigeon), Green Palm Lorikeet, Vanuatu Chestnut-bellied Kingfisher, Royal Parrot finch and Santos Mountain Starling (Vulnerable); Thicket Warbler, Rusty-winged Starling and Tanna Fruit-Dove (Near Threatened). Recent surveys by DEPC and partners in 2021 have recorded new bird records. The report is being drafted (Baereleo pers. comm. 2022).

Species Highlight: *Aplonis santoveris* – Santos Mountain Starling



The Mountain Starling of Santo is an Endangered species. It is found on the high mountains along the West coast of Espiritu Santo (IUCN Red List, 2022). It is restricted to the Santo Mountain Range Key Biodiversity Area (KBA). Intensive fieldwork in this area by Steven Totterman in 2010 (pers comm.) indicated that it was likely to be locally common above 1600 m within this area (i.e. restricted to about 21 km² of suitable habitats (Tracewski et al. 2016). Not subsequently recorded, although the extent to which overseas birdwatchers covered the highest ground within the KBA, and the impact of unfavourable weather conditions may explain this gap. In 2021, two sightings were recorded at 1270 m (asl) on the slopes of Mt Tabwemasana in 2021 (Ramik et al. 2022, report edited by Sue Maturin). Discussions with elders in Kerepua indicated that they were

familiar with the species from the time that they lived in Nokovula village, in the mountains, who regularly saw the birds in the 1960s and 1970s, before they moved down to the village. One of the elders recalls two sites where the bird was frequently seen. According to him, the bird was very wary and often took flight at the slightest disturbance. The bird recorded in 2021 was at one of these locations. Local knowledge will assist in identifying sites where the birds can be observed and help with enumerating the population. Although the official sighting was 2010, local guides have seen the birds at Mt Watiamasan in 2021. The Santo Sunset Network was established in 2016 as a result of a mass awareness campaign for the protection and conservation of biodiversity within the largest KBA in Vanuatu, the Santo Mountain Range. The campaign was organised by Live & Learn Environmental Education with support from international partners (CEPF and Hope Foundation). Over 10,000 ha of forest has been declared for conservation, in an effort to protect the endemic flora and fauna species in the KBA. The communities of Kerepua and West Coast Santo declared Mount Tabwemasana a Community Conservation Area in 2018. The CCA is formally registered under the EPC Act Cap 283. Mount Tabwemasana is one of the very few sites where this species has been seen.

Rolenas Tavue Baereleo and Mark O'Brien

Image source: CC-BY-SA

Reptiles

There are nine endemic reptiles of which the Anatom Emo Skink (*Emoia aneityumensis*), found only on Aneityum, is endangered and the common Emo Skink (*E. erronan*), found only on Futuna and Aniwa, is endangered. The saltwater crocodile (*Crocodylus porosus*) is limited to Vanua Lava Island in the northern part of the country, and is the eastern-most limit of its distribution.

Table 24: Vanuatu Reptiles assessed under the IUCN Red List. (IUCN Red List)

SPECIES COMMON NAME	RED LIST CATEGORY	TREND
<i>Brachylophus bulabula</i> Fiji Banded Iguana  Image source: CC BY-SA 4.0 (J Sutton93)	Endangered	Decreasing
<i>Emoia aneityumensis</i> Anatom Emo Skink	Endangered	Decreasing (see Species Highlight)
<i>Emoia erronan</i> Erronan Tree skink 	Vulnerable	Stable
<i>Laticauda frontalis</i> Yellow-Lipped Sea Snake	Near Threatened	Unknown
<i>Chelonia mydas</i> Green Turtle  Image source: CC BY-SA 3.0 (Brocken Inaglor)	Endangered	Decreasing
<i>Eretmochelys imbricata</i> Hawksbill Turtle  Image source: CC BY-SA 3.0 (Thierry Caro)	Critically Endangered	Decreasing

Species Highlight: *Emoia aneityumensis* - Anatom skink



The Anatom (*Emoia aneityumensis*) from Aneityum Island is IUCN Red List assessed as Endangered. It was first described in 1974 on Aneityum Island. According to the IUCN Red List, the Anatom Skink is reported from two locations within a 160 km² range. The key threats are agricultural expansion and logging, which degrade

the species habitat (IUCN Red List 2022). The IUCN Red List information is based on a study carried out by Hamilton and others in 2011. A recent study by EDA, found 62 individuals, with most of the records from the northern part of Aneityum (Baereleo pers. comm. 2021). Locals noted that the species, known locally as Namapmap due to the species being found close to the Tahitian Chestnut tree, is common around the island. One particular habitat is around swampy forested areas. The locals further noted that the numbers seem to have declined possibly due to habitat change. Possible new threats to the species are the pet trade and sea level rise. The vulnerable population and distribution of the species have been communicated with Aneityum chiefs. There are being proposed to ensure that the species is protected, such as reinforcing conservation measures of Aneityum's Key Biodiversity Area. Reducing habitat loss and degradation is another important conservation measure.

Information & image source: Baereleo pers comm.(2021)

Flora

Vanuatu's flora is closely allied with that of Solomon Islands to the north of the archipelago, with some elements from Fiji, and very few from Australia or New Caledonia. However, there is considerable variation between different plant families. For example, 59% of palm genera are shared with Fiji with a much lower proportion affiliated with palms in the Solomon Islands. The actual number of plant species for Vanuatu remains unknown despite many botanical excursions and surveys being undertaken (e.g., Chambers and Bani 1988, Environment Unit 1999, Lowry II and Munzinger 2006). The Forestry Department has pursued a forest inventory from 2019 to early 2021 for most of the main islands and some smaller ones. Included in the inventory were updated land use maps for all of the islands. The results are to be published. The current estimate is around 1000 vascular plants of which 150 are endemics. The number of Bryophytes (mosses, liverworts, etc.) is 700. Seven of the 168 species of orchids are endemic to Vanuatu. One endemic and monospecific genus of palm (*Carpoxydon macrosporum* – Figure 41) plus an additional 14 endemic species (11 of which are rare or vulnerable). There are 12 species of Araceae including eight endemics and about 250 Pteridophytes (ferns and fern-like plants).

VANUATU BOTANICAL PROFILE

236 Vanuatu plant species have been assessed under the IUCN Red List (Figure 61)

4 are Critically Endangered

5 are Endangered

6 are Vulnerable

6 are Near Threatened

200 are of Least Concerned

From the 168 endemic plants of Vanuatu, only 10 have been assessed, and eight of these were assessed using an outdated protocol and need updating. The trend for the majority of the species assessed was Stable (47%), or Unknown (37%); 15% were considered Declining and 1% was Increasing in population (Figure 62). The two species that are increasing in population included an environmental weed (*Crotalaria quinquefolia*) and a seagrass (*Halophila minor*). There is an urgent need to assess more plant species. The existing knowledge on Vanuatu's flora needs to be updated, with monitoring and full-scale assessments to be carried out on a regular basis.

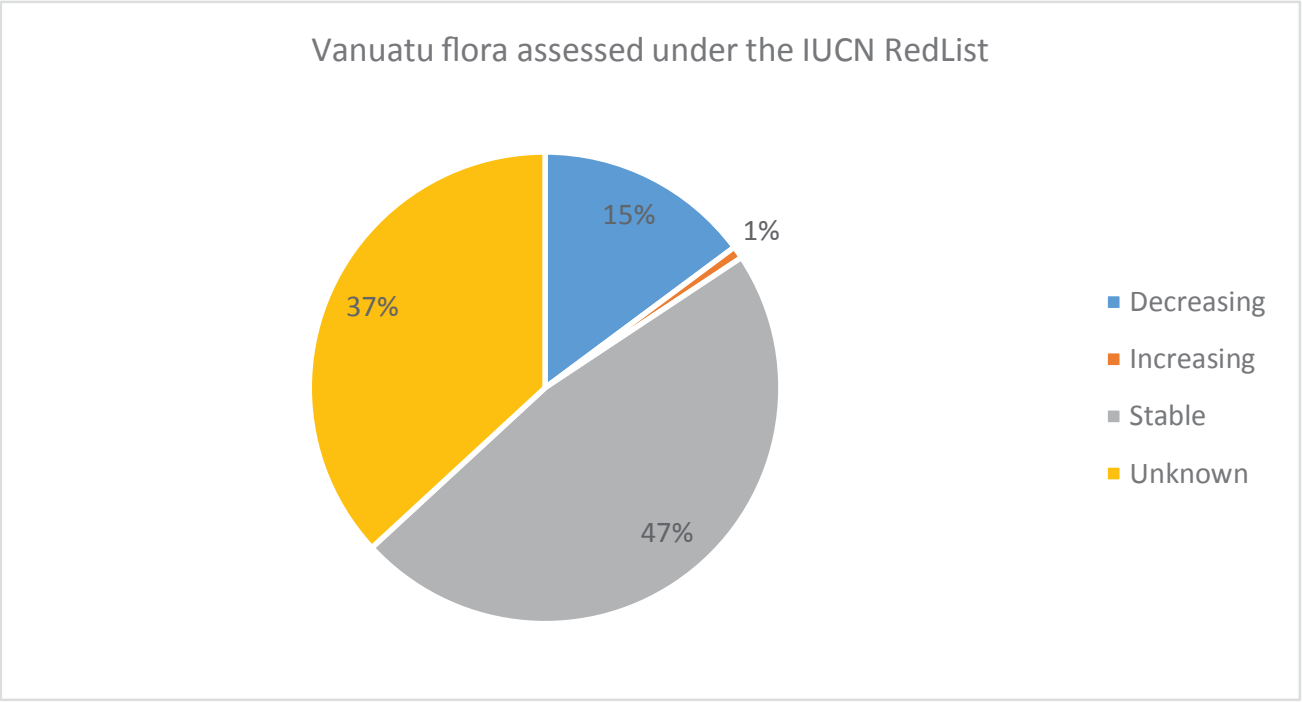


Figure 61: Vanuatu plant species assessed under the IUCN Red List [CE- Critically Endangered, DD – Data Deficient, EN – Endangered, LC – Least Concern, LR – Low Risk, NT – Near Threatened, VU – Vulnerable]. (IUCN 2022)

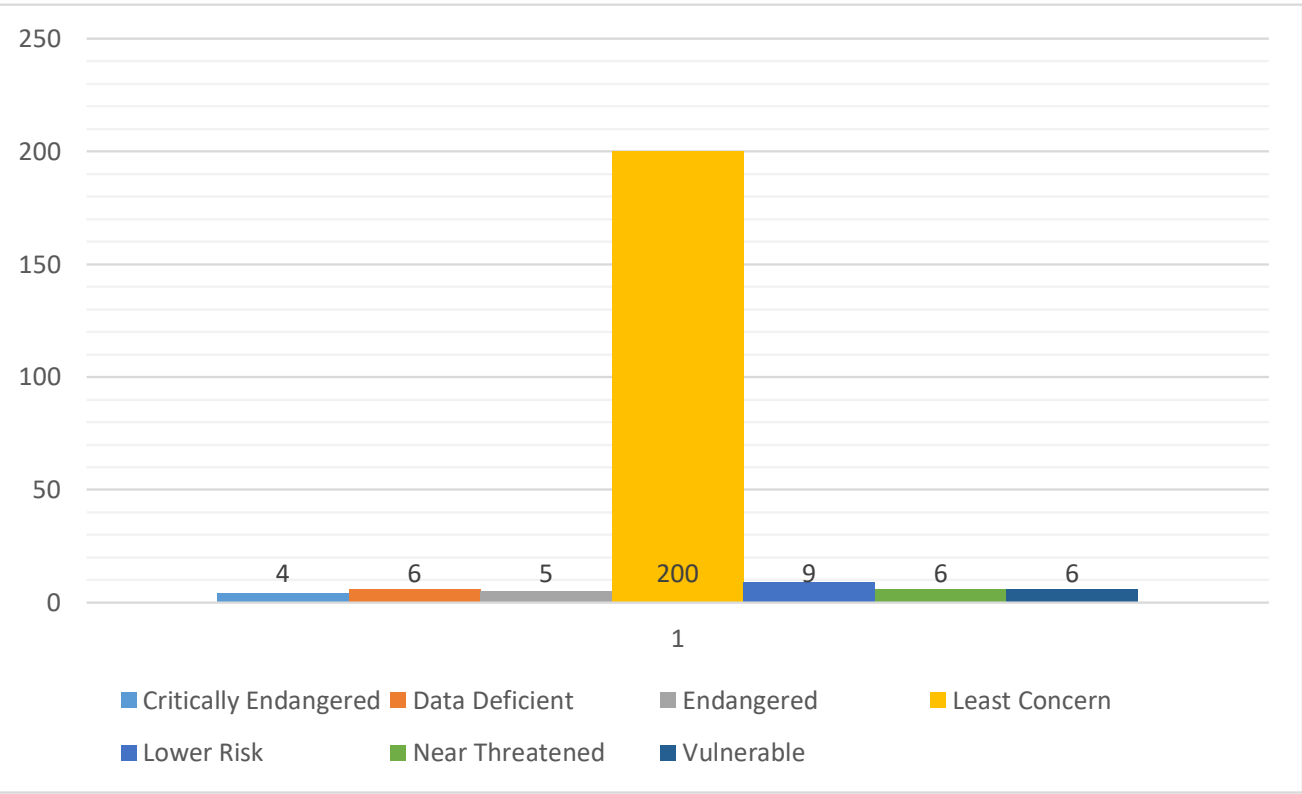


Figure 62: Number of species being assessed and the overall trend in their Red List status. [CE- Critically Endangered, DD – Data Deficient, EN – Endangered, LC – Least Concern, LR – Low Risk, NT – Near Threatened, VU – Vulnerable]. (IUCN 2022)

Species Highlight: *Carpoxylon macrospermum*



This palm can become very large, with the trunk reaching 20 m in height and 30 cm in diameter at breast height (DBH). The leaves are pinnate and arching, and the fruits are red at maturity, measuring 6 cm long and 4 cm wide. *Carpoxylon* is the only monospecific genus in Vanuatu (i.e. with just one species), and because it is highly threatened, it has become one of the symbols for preserving the country's flora. At one point, it was only known from a few individuals in the south of the archipelago, but is now widely planted and distributed. Some seedlings collected from Casavea village in south Santo island were planted in front of the Parliament house as part of the in situ conservation efforts.



On Santo, *C. macrospermum* can be seen growing in cultivation around houses and in gardens. The young fruits of this palm are edible, although when mature the endosperm is no longer palatable. The leaves are made into brooms and the trunks can yield high quality wood. However, on Santo *C. macrospermum* is mostly grown for its ornamental qualities and for its value as a rare plant.

Figure 63: *Carpoxylon macrospermum* a critically endangered species of Vanuatu.

There is an urgent need to assess more Vanuatu plant species. Current species numbers and abundance need to be updated with consistent monitoring, as full-scale assessments were sporadic over the last few decades.

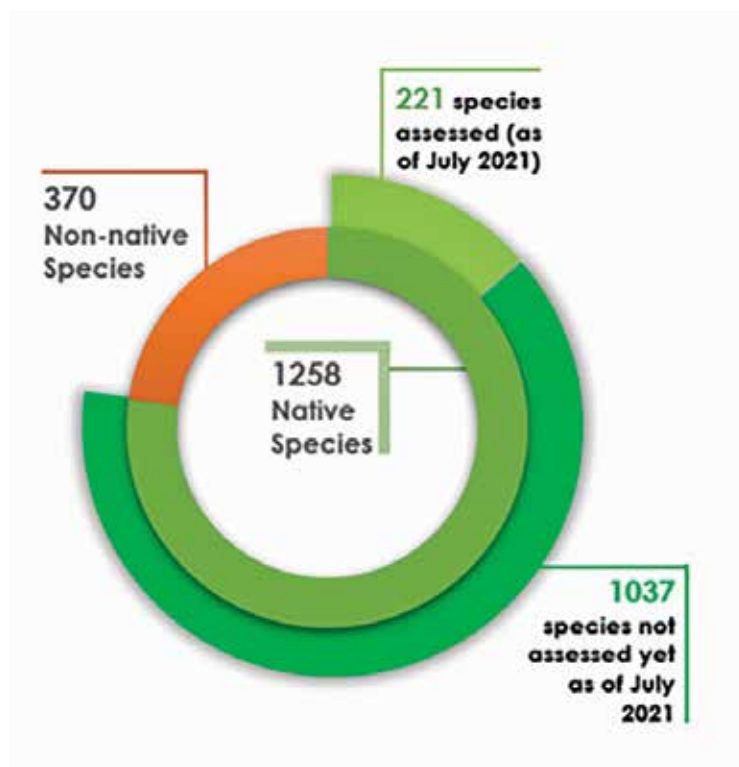


Figure 64: Vanuatu plant species on the IUCN Red List. (DEPC)

Fauna

There are 38-recorded endemic freshwater species, of which only the Lobed River Mullet (*Cestraeus plicatilis*) is listed on the IUCN Red List. The rest of the endemic freshwater species need assessments. Recent surveys conducted by the French Natural History Museum from 2002 to 2010 found 12 endemic freshwater fish: Five were endemic to Vanuatu, and seven were endemic to both Vanuatu and New Caledonia.

The IUCN Red List assessed 2311 terrestrial and marine animal species reported from Vanuatu (Figure 64). Although Vanuatu has recorded 134 bird species, only 124 have been IUCN Red List assessed; other major biodiversity being assessed included 28 reptiles and 12 flying foxes and bats. Invertebrate diversity is not fully described, nor assessed but it includes the coconut crab (*Birgus latro*). The Coconut crab is the largest land crab and it is also an important food resource for many Vanuatu communities (GOV 2014). Very little is known of other small and cryptic species (Baereleo pers. comm. 2022).

Twenty-six of the Red Listed species are also listed for Vanuatu under the Convention of Migratory species (CMS) under its various categories (Vanuatu SUMA report 2018). Some of the high profile species include the turtles - Green, Hawksbill, and the Leatherback. Turtle tagging has been carried out in Vanuatu for many years. Dugong (Figure 65), Dolphins, sharks and whales are also listed on the IUCN Red List, although their status and trends in the country remain unknown.

Species Highlight: *Dugong dugon* - Dugon



Dugong habitat extends from the Indian Ocean to the Pacific, and Vanuatu lies on the eastern edge of the dugongs' range. Vanuatu's islands are geologically young volcanic islands and therefore the fringing reefs are narrow. Consequently, the suitable habitat for seagrass, and therefore dugongs, is limited to patches along the coast. There has only been one manned aerial survey of dugongs, the gold standard method for assessing dugongs, in Vanuatu. It was conducted in 1988 and was part of a wider project assessing Vanuatu's marine

resources by AIMS (Chambers et al. 1989). In that 3-day survey only 11 dugongs were recorded in the Vanuatu islands. The weather was not good and none of the spotters had had any previous experience in aerial surveys. Therefore, the results of that survey should be interpreted with caution, and it is likely many more dugongs were present at that time. The researchers concluded in 1988 that the population of dugongs in Vanuatu was likely to be stable as there were few threats and they were regularly sighted throughout the archipelago. In the thirty years since, threats to dugongs, listed as vulnerable to extinction under the IUCN Red List of threatened species, have increased. Gillnet fishing is more common with more access by local fishers to stores that sell nets; boats powered by outboard engines are replacing traditional outrigger canoes for sea transport and fishing activities; climate change is resulting in more extreme weather including high intensity cyclones; development is expanding along the coasts of many islands, particularly in sheltered bays where seagrass and therefore dugongs are more likely to be found. This development includes local villages expanding as well as tourism properties and infrastructure development, such as road building. This not only increases disturbance to the dugongs but can affect the seagrass meadows that the dugongs depend on for survival and successful reproduction. With these increasing threats it is important to establish a baseline for the abundance of dugongs in Vanuatu and a monitoring programme to discern population trends so intervention can be made early if a decline in numbers is detected.

Updates to the knowledge about the distribution of dugongs and seagrass in Vanuatu and the threats they face was possible under the GEF-funded Dugong and Seagrass Conservation Project (2015 -2018), where the Vanuatu Fisheries Department (VFD) the Department of Environmental Protection and Conservation and the Vanuatu Environmental Science Society (VESS) partnered to deliver the project in Vanuatu. VESS conducted a questionnaire survey throughout Vanuatu in 2016 and 2017 using the Convention on the Conservation of Migratory Species of Wild Animals (CMS) Standardised Dugong Catch / By-Catch Questionnaire. The results of the survey show that dugongs are sighted throughout the archipelago in most of the major island groups in Vanuatu. Seagrass (an important food source for Dugongs) is also reported throughout Vanuatu and is usually in small pockets. The general perception is that the number of dugongs is not decreasing and that most people are happy to have dugongs in their area. Dugongs are seen as friendly and important to the ecosystem. Gillnet fishing is common including in areas known to have dugongs and this poses a significant threat to dugongs, particularly as many nets are left unattended, including at night. Twenty dugong conservation hotspots have been identified using the data from the survey and will help to concentrate the conservation efforts to where they will have the most impact.

Dr Christina Shaw | VESS

Image source: ©Big Blue Dive

Figure 65: Dugong is an iconic and a protected species in Vanuatu waters.

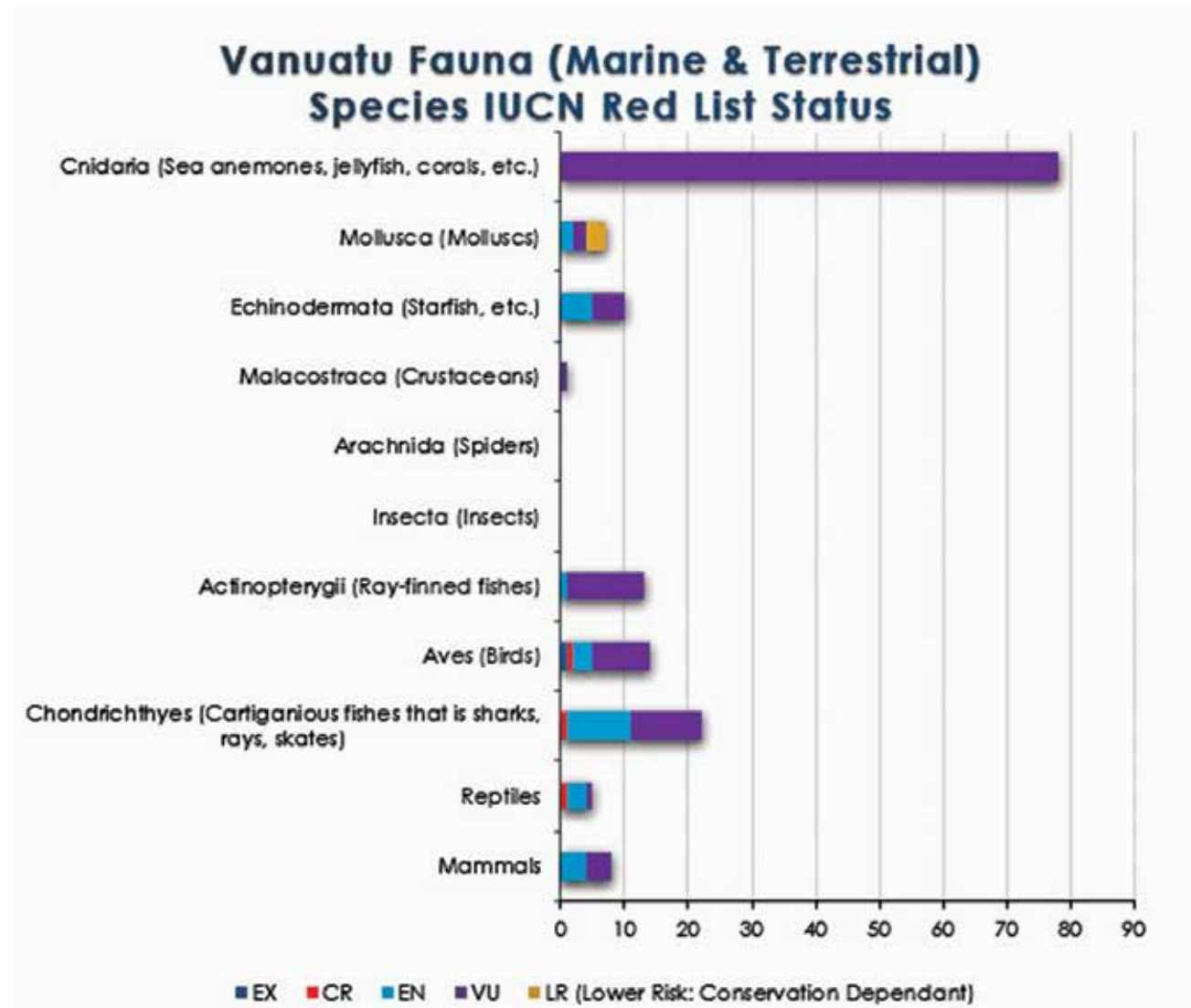


Figure 66: Vanuatu terrestrial and marine fauna on the IUCN Red List. (IUCN 2022)

Species Highlight: *Pteropus fundatus* - Banks Flying Fox



The Banks flying fox (*Pteropus fundatus*) is one of two endemic fruit bats in Vanuatu. This small red-brown flying fox has a range restricted to the Banks islands in the far north of Vanuatu. It was first described in the 1970s, with specimens collected from the islands of Mota, Mota Lava and Vanua Lava. Since then, there have been few scientific studies on the Banks Flying Fox. Another collection of specimens by the Australian Museum in 1990 confirmed its presence on the island of Mota. Recent Banks Flying Fox studies by the Vanuatu Environmental Science Society (VESS) have again confirmed the bats are present on Mota island with four individuals being caught and released in 2018. The island of Mota is just 10 km², which is very small making the Banks Flying Fox highly vulnerable and being endangered of becoming extinct. Sightings have been reported by local people from the other islands in the Banks group but as the Banks Flying Fox is very similar in appearance to the Vanuatu Flying fox (*Pteropus anetianus*), which can vary from white to red-brown depending on the

subspecies, more work is needed to verify the range of Banks Flying Fox. VESS's studies, using both local and scientific methodologies, revealed that the Banks Flying Fox tends to roost and feed alone and uses both the forest and the modified habitat of plantations and subsistence gardens to forage. Its solitary lifestyle means this flying fox is hard to study but also is less of a target for hunters compared to the more gregarious Pacific flying fox (*Pteropus tongonas*) that roosts in large camps and can be found on many Pacific islands. Hunting pressure is low but the chiefs in several of the Banks Islands, including all chiefs in Mota, have agreed to stop the hunting of the two endemic flying foxes as a measure to conserve them. Several community members have been trained in bat monitoring techniques and have started to record sightings of the Banks flying fox. VESS has conducted an awareness programme throughout the Banks islands to increase the understanding of the ecosystem services that bats provide and share the uniqueness of this small flying fox with the communities in order to increase pride and ownership of the protection of these bats. Work should continue to support the local communities to protect the habitat of the Banks Flying fox and to monitor the populations. Scientific studies are also needed to confirm the range and better understand the biology and ecology of this secretive bat to inform conservation measures and ensure the habitat needs of the bats can be met now and in the future.

Information & Image source: Dr. Christina Shaw | VESS

Figure 67: Banks Flying Fox is an endemic mammal of Vanuatu.

Species of National Significance

A list of species that are important to Vanuatu has been compiled by the DEPC in consultation with local communities. The species are those that communities recognised as important from a cultural perspective, as well as their importance in food consumption and production. The list also includes species that are endemic, rare and threatened throughout the archipelago. When communities want to establish conservation areas, DEPC discusses with them a list of species that they would like to protect within their conservation area. In the conservation area management plan, the community takes responsibility to monitor the presence and the population status of species within their conservation area, with support from DEPC. The species of national significance are listed in ANNEX 8 – Vanuatu Species of National Significance.

Impact

Some of the key threats that are affecting Vanuatu's biodiversity include over-harvesting, pollution, invasive species, agricultural expansion, illegal infrastructure development, natural disasters and climate change. The greatest threats to biodiversity conservation result from human activities. Human settlements are generally concentrated in the coastal lowlands. Consequently, biodiversity is most at risk in lowland and coastal areas and small islands, yet remains relatively intact in the high-altitude forests of larger islands. Exploitation is the most significant threat faced by (or potentially faced by) Vanuatu's threatened (Critically Endangered, Rare, Endangered or Vulnerable) species recorded in the IUCN Red List. Hunting and exploitation affect 66% of total threatened species in Vanuatu, while agriculture and invasive alien species affect 20% and 15% of threatened

species in Vanuatu, respectively. Some species face multiple threats. For example, the Endangered Santa Cruz Ground Dove (*Gallicolumba sanctaecrucis*) is threatened by hunting and exploitation, the widespread invasive vine *Merremia peltata*, and competition from the common native Emerald Dove (*Chalcophaps indica*) in degraded forest. In many islands, Partulid snails have been wiped out by the Rosy Wolf-snail (*Euglandina rosea*), which is found in Vanuatu. The Common and Jungle Mynahs are also competing with native birds for food and space, and the Giant African Snail affects the gardens of many of the communities especially in places where they exist.

As more species are assessed under the IUCN Red List, there is a trend of the lack of information on many of the species, in terms of their population, distribution and biology. There are some species with a general decline in population, based on the anecdotal reports from locals, who once saw the species in great numbers 50 or more years ago (e.g. Santo Mountain Starling). Vanuatu's biodiversity continues to be under threat from invasive species, habitat degradation and extreme weather events. With the loss of any species, there is a loss to traditional knowledge, as well as the ecological function of that species. This issue needs to be prioritised and resolved.

Response

Despite the impacts of threats including overharvesting, pollution, invasive species and climate change, much of Vanuatu's biodiversity is relatively well protected, with only a small number of species assessed as being globally threatened (IUCN 2020). This is likely due to the fact that Vanuatu's biodiversity largely comprises marine species – distributed over Vanuatu's vast EEZ. Vanuatu has one recorded extinction: the Tanna Ground Dove (*Gallicolumba ferruginea*). Extinction drivers for this species are believed to have been hunting and predation by domesticated and feral mammals.

There is legislation (Environmental Protection and Conservation Act CAP 283) enacted for the protection of biodiversity and establishing protected areas (Part 4 of the Act). There is also the National Parks Act, which allows for the declaration of national parks and nature reserves. According to this legislation, a National Park or Reserves may include areas that have unique ecosystems, genetic resources or physical and biological formation, habitat of threatened species, outstanding natural beauty, archaeological, scientific or of environmental significance. Vanuatu has also passed the International Trade (Fauna and Flora) Act, as part of its commitment to the International Convention on International Trade in Endangered Species of Wild Fauna and Flora.

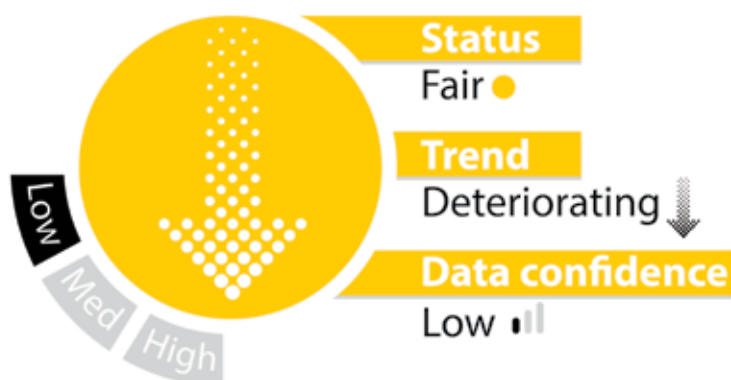
There are also environmental national policies that set the framework for the work in environmental protection and conservation. In particular, the Vanuatu 2030 – The People's Plan – National Sustainable Development Plan, the National Environment Policy and Implementation Plan, the National Biodiversity Strategy and Action Plan and the National Invasive Species Strategy and Action Plan (NISSAP).

Recommendations

- Some of Vanuatu's diversity beneath the species level has only been classified by indigenous knowledge systems that vary from one language group to another. There is an urgent need to document this knowledge.
- Build the capacity of locals to undertake biodiversity and conservation management work. Ensure that there are sufficient resources to support their work.
- Continue to research and monitor all biodiversity groups (e.g., birds, reptiles, molluscs and flora) so that population and trends are better understood.
- Build and enhance local scientific capacity to address Vanuatu's biodiversity issues and aspirations both at the national level and within departments like DEPC and with civil society.
- Develop Vanuatu's Red list taking into account the importance of the species from a cultural and social perspective.
- Strengthen existing legislation to ensure that species of national significance are protected and conservation measures such as translocation between islands are permitted for ex situ conservation purposes.
- Encourage government departments to work with civil society and communities to update Key Biodiversity Areas.
- Develop a national Terrestrial Spatial Planning (TSP).
- Finalise the draft national Marine Spatial Planning (MSP).

- Raise national awareness that encourages environmental pride and communities' participation in the protection and management of Vanuatu's biodiversity.
- Support the work of curators (herbarium) by securing funding resources to allow them to continue to be custodians of Vanuatu's natural heritage.
- Have sustainable financing mechanisms in place for biodiversity management at the national level with line agencies like DEPC; but also available to NGO partners and communities.
- Build upon the "Species Management: Scientific study and community awareness-raising of indigenous flying fox species" project efforts by VESS with the Banks Flying Fox and the Fiji Mastiff bat.
- Build upon Endangered Species, specifically management programs like sustainable management of the Megapode populations on Tonga and Ambryn, and the Collared Petrel on Tanna.
- Continue the work on the species management with conservation activities for the protection of leatherback, green and hawksbill turtles, by the Government, NGOs and CBOs.
- Continue the work on species management with conservation activities for the protection of dugongs and seagrass by Government and NGOS.
- Build local scientific capacity to undertake research and implement conservation measures on threatened wetland species and other species of conservation interest in Vanuatu.
- Develop management plans for priority species that are critically endangered.
- Review and improve regulations to allow for legal protections of priority species.

3.4.2 Wetlands



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 6.6, 12.2, 15.1, 15.2, 15.5		SAMOA Pathway 90, 94	National Sustainable Development Plan ENV 4; 5 National Environmental Policy and Implementation Plan Goal 3 NOP 6.4

Indicator definition

Wetlands are vital for human survival. They are among the world's most productive environments. Sadly, wetlands continue to be degraded and lost in many parts of the world, including the Pacific region. This compromises the ecosystem services that the wetland systems provide for the wellbeing of the nation. The international convention on wetlands, known as the Ramsar Convention, defines wetlands in the broadest sense that includes rivers, underground aquifers, lakes, swamps and marshes, mangroves, tidal flats, coastal areas and coral reefs. For this assessment, the key wetlands being assessed on the quality of their health are the rivers, lakes, mangroves and seagrasses. The number of known freshwater biodiversity is also enumerated.

Status and Key Findings

Wetlands are among the world's most productive (and threatened) ecosystems and the services that they provide to communities are significant. Vanuatu is blessed with diverse island types, some with high topography and plenty of rainfall to sustain a variety of wetland systems. There are about 30 freshwater lakes in Vanuatu, with Lake Letas, located on Gaua Island, the largest in the country. Lake Letas has been nominated as a Ramsar Site and is one of several crater-lakes located at the base of an active volcano (Mount Garek) (Figure 68). Other unique Vanuatu lakes include the caldera lakes of Ambae, with the active volcano Waivundolue, at over 1300 m elevation are the highest lakes in the Pacific islands. There are also lakes found in low-lying areas, supporting marsh vegetation and other unique wildlife. Many of these lakes are

seasonal, whereas tidal movement influences others. One of the largest brackish water lakes is Lake Nalema located on east Epi. Ekasuvat Lagoon on Efate is the largest enclosed saline lagoon and the most impacted from urban developments (Bani and Esrom 1993). There are about 13 sites that qualify as national wetlands, besides Lake Letas, there is also Duck Lake above Teouma on Efate, Port Stanley on Malekula and the Matevulu Blue Hole on Santo (Baereleo pers. comm. 2022). Unfortunately, many of these sites are not regularly monitored or surveyed (Table 25).



Figure 68: Lake Letas is an internationally recognised Ramsar site. (DEPC)

Table 25: National wetland sites and area (Bani and Esrom 1993; Kalfatak and Jaensch 2014)

WETLAND SITES	SIZE
Alligator River	30 ha. Located East coast of Vanua Lava Island. A tidal inlet mangrove forest. Supports the rare population of the estuarine crocodile (<i>Crocodylus porosus</i>).
Nagpen (Selva) River	36.5 ha Lake Letas. Located near the southern end of Vanua Lava Island. Approx. 10 km of river. An unusually sterile river draining a large area of sulphur springs.
Lake Letas	1971 ha. Located centre of Gaua (Santa Maria) Is. A deep freshwater lake and associated marsh in volcanic crater. Lake has an active volcanic cone emerging at one side and hot springs on the inner crater wall.
Jordan River Lower Reaches and Floodplain Wetlands	3335 ha. Located south of Big Bay in North-Central Santo. A large area of freshwater marshes and swamp forest on the floodplain of several rivers entering Big Bay.
Lake Wai Memea	6 ha. Located Northwest tip of Ambae (Aoba) Island. A small freshwater crater lake with some swamp vegetation.

WETLAND SITES	SIZE
Lake Wai Lembutaga	10 ha. Located NE of Ambae (Aoba) Is. Freshwater Crater Lake with extensive beds of papyrus. No conservation measures taken.
Ambae Caldera Lakes Area: Lake Manaro Ngoru	15 ha. Surrounded by dense virgin rainforest. Ambae (Aoba) Is.
Lake Vui	150 ha. Surrounded by dense virgin rainforest. Ambae (Aoba) Is. Thermal springs found.
Lake Manaro Lakua	170 ha. Located in the centre of Ambae (Aoba) Is. Surrounded by dense virgin rainforest. Thermal springs.
Port Stanley, Bushman Bay and Crab Bay	4132 ha. As originally described, the site included 963 ha of mangrove forest. Located NE coast of Malekula is. Include one of the largest areas of mangroves (see Mangroves).
Port Sandwich, Cook Bay and the Maskelyne Islands	7004 ha. Located SE tip of Malekula is. Include mangrove forests, tidal lagoons, salt marshes, and mudflats.
South-west Bay Lagoon (Tisri Lagoon)	194 ha. Located SW coast of Malekula Island. Include small patch of mangrove forest.
Duck Lake (Emaotul)	76.3 ha. Located east of Port Vila. Efate Is. A small freshwater lake with associated swamp vegetation, forest and lowland rainforest.
Emaotfer Swamp	192 ha. Located SE of Port Vila. Efate Is. A small freshwater swamp.
Lake Isiwi	Formerly 225 ha; now nil. Located at the foot of Yasur Volcano on Tanna Island. A freshwater volcanic lake with some marsh vegetation.
South-east Santo Blue Holes	Six separate ponds, each less than 1.0 ha in area (total area about 5 ha).
Creek Ai	50 ha. Northwest of Efate.



Figure 69: Location of wetlands in the northern part of Vanuatu. (Kalfatek and Jaensch 2014)

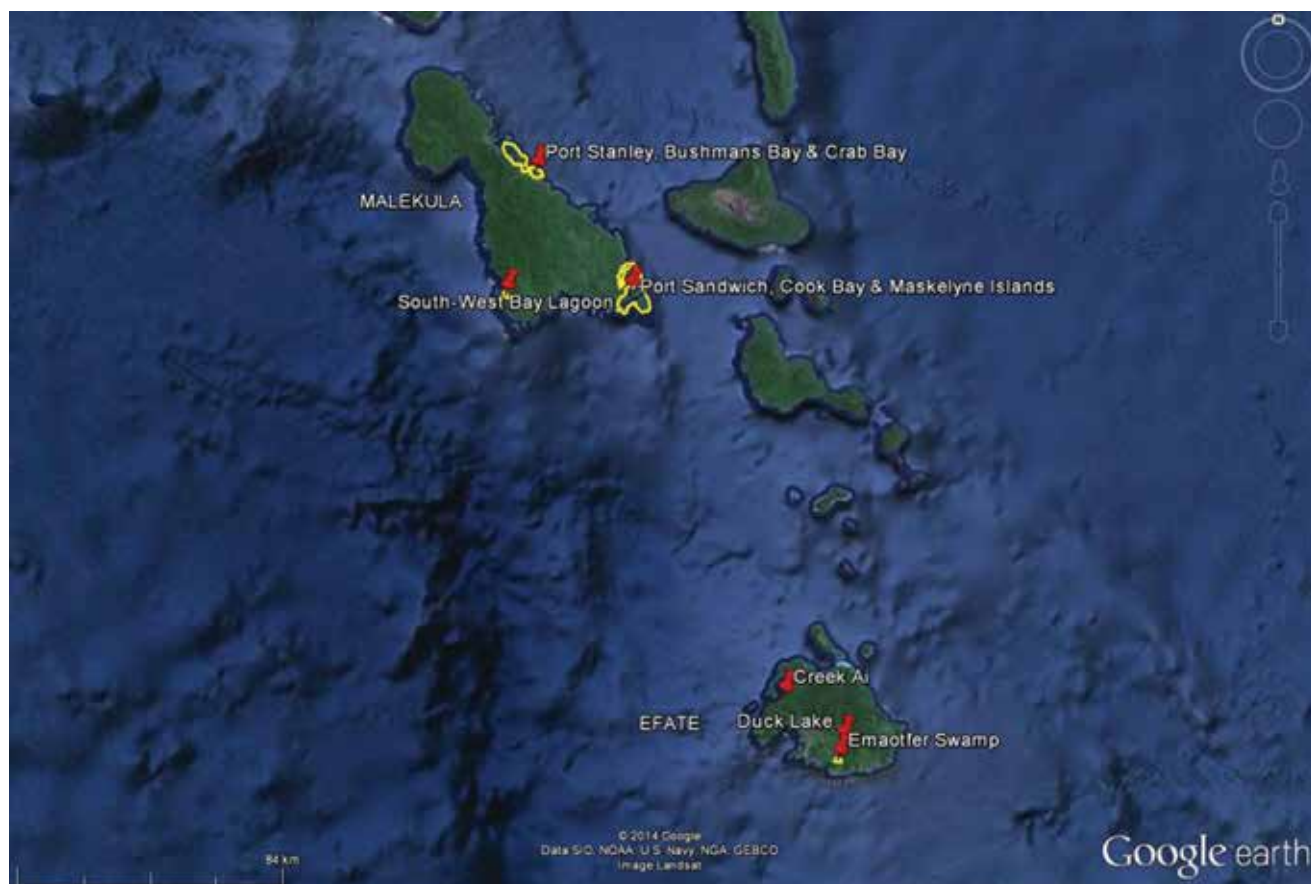


Figure 70: Location of wetlands in the southern part of Vanuatu. (Kalfatek and Jaensch 2014).

Rivers

There are 14 rivers of significance throughout the country (Figure 71), with Sanma Province having the most numbers of rivers. The largest rivers are located on Espiritu Santo and Malekula. The Teouma River (Efate) and the Matenoi River (Malekula), flow through spectacular and almost inaccessible limestone gorges for much of their length. The main flood plain area is formed by the rivers that drain the Tabwemasana Range of central Santo and flow north into Big Bay (Bani and Esrom 1993). Some rivers, particularly in areas made up largely of raised reefs, e.g., eastern Espiritu Santo, coastal Efate and the Torres Islands, flow only at times of heavy rainfall. On some islands, there is little or no surface water for all or much of the year because of the porous nature of the uplifted coral substrates.

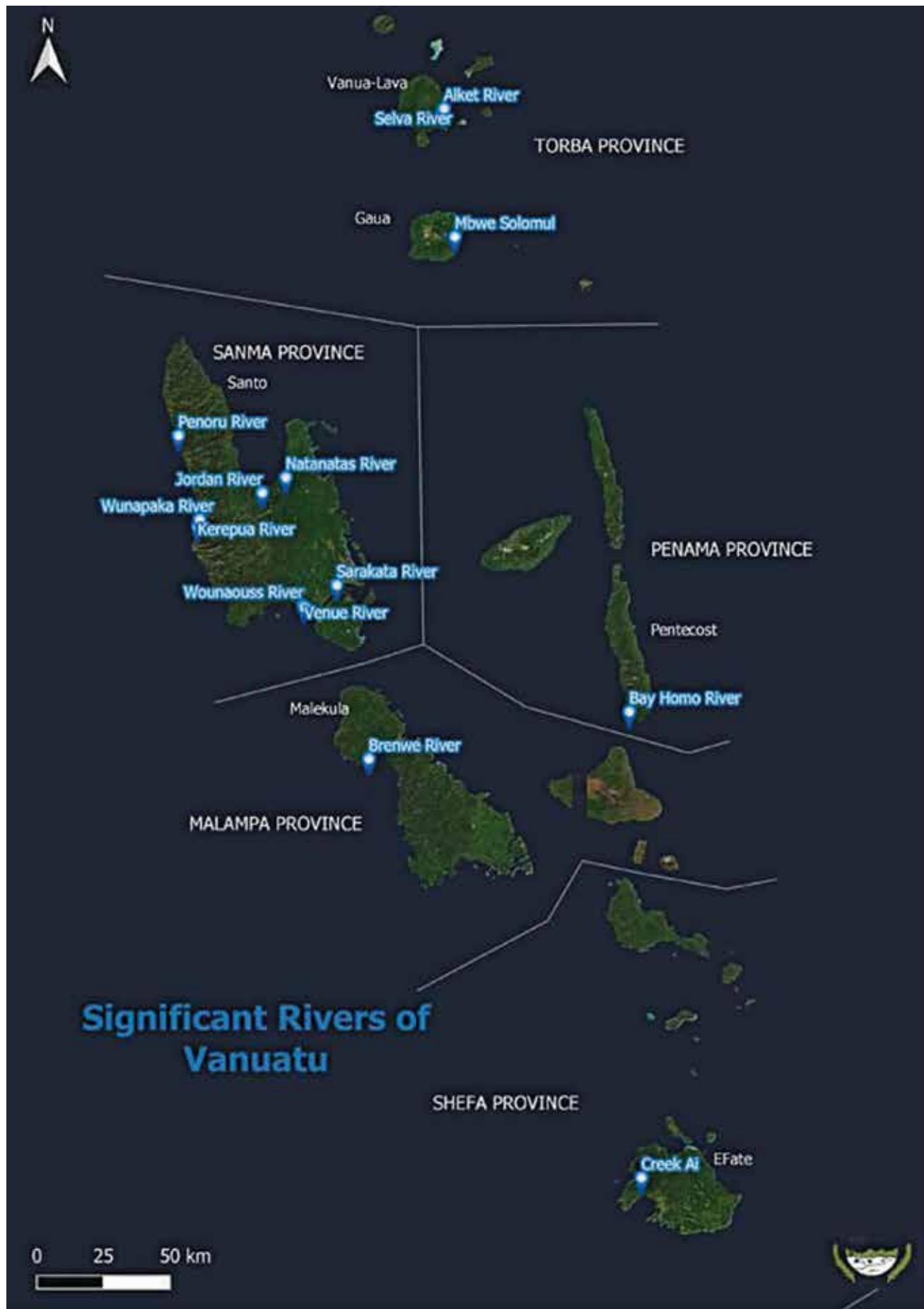


Figure 71: Significant rivers where surveys of freshwater species were undertaken. (DEPC)

Freshwater Swamps



Figure 72: One of Vanuatu’s freshwater swamps. (DEPC)

Freshwater swamps and swamp forests are generally small and few in numbers (Figure 72). They occur as fringing areas around lakes on Efate and Thion Island, in depressions on plateaus (Efate, Epi, Maewo and Gaua), in extinct volcanoes such as Vanua Lava, or on floodplains such as those of the rivers entering Big Bay on Santo (Chambers 1992). Patches of swamp forest on Efate are dominated by species of *Barringtonia* and *Pandanus*, while those on Malekula are dominated by species of *Hibiscus* and *Metroxylon*. The largest area of swamp forest in Vanuatu occurs on the floodplains south of Big Bay on Espiritu Santo. These floodplains receive most of the rivers that drain the island’s high mountain massif, and support a particularly rich and diverse swamp forest community dominated by species of *Hibiscus* and Coral Tree (*Erythrina*).

Mangroves

Nearly 50% of mangrove losses in the Pacific have been attributed to extreme weather events (Spalding and Leal 2021). The protection of wetland areas has been challenging in the Pacific, largely due to the negative perception accorded to some of the sites. Only 9% (or 565 km²) of mangrove areas in the Pacific island region has some protection, which equates to about 2.7 km² of Vanuatu’s mangroves.

Mangrove forests constitute the most extensive wetland vegetation in Vanuatu (Bani and Esrom 1993). The actual size is not known but an estimate suggests between 2,500 ha and 3,000 ha (25-30 km²) (FAO 2005). Malekula hosts the biggest mangrove forests (just under 2,000 ha | 20 km²) distributed in two large areas along the east coast (Laffoley

2013). In other areas, mangroves occur as small stands or narrow belts along coastal areas and estuaries (Table 26). There are 24 mangrove associated plant species in Vanuatu, making it one of the most diverse in the Pacific (Table 27) (Duke et al. 2012; Baelereos et al. 2013). The social benefit of carbon sequestration by mangroves in Vanuatu’s EEZ is estimated to be worth up to USD4 million (Pascal et al. 2015).

Table 26: Mangrove sites and their estimated sizes. (Lal and Esrom 1990).

MANGROVE SITES	MANGROVE AREAS (HA)
Malekula	1,915
Hiu	210
Efate	100
Emae	70
Epi	60
Vanua Lava	35
Ureparapara	30
Mota Lava	25
Aniwa	15

Mangrove forests surveys have only been carried out at a few sites, usually during project activities (e.g. Crab Bay, Malekula and Eratap, Efate during the Mangrove Ecosystems of Climate Change Adaptation & Livelihoods [MESCAL] Project in 2012-2013 period). The results from the MESCAL project found mangroves at Crab

Bay to be in very good health (90%), and expanding in growth (Figure 73) (IUCN 2014; Mackenzie, et al. 2012). The project estimated the value of the mangrove ecosystems for both Crab Bay and Eratap to around VT386,000/ha/annum (USD85,000) in Crab Bay and VT768,000/ha/annum (USD85,000) in Eratap. Another important ecosystem service of mangrove forests is carbon sequestration with Vanuatu mangroves estimated to sequester between USD68,000/year to USD 563,000/year (IUCN, 2014). Some human activities were evident by the gaps in the mangroves, which were cleared for access to the shoreline.

The results from the Eratap mangrove survey found a very good or good health (78%) cover, although the level of growth expansion was lower than at Crab Bay (Figure 74). The area is exposed to high levels of human disturbance, which is evident in the fragmentation and gaps in mangrove forests. The construction of Aquana Beach resort has resulted in the loss of approximately 220 m² of mangrove.

Table 27: List of mangrove species recorded from Vanuatu. Species that are underlined refer to those likely to be present. (Duke et al. 2012)

VANUATU'S MANGROVE SPECIES	
<u>Acanthus ilicifolius</u> , <i>Acrostichum aureum</i> , <i>Acrostichum speciosum</i> , <i>Avicennia marina</i> , <i>Bruguiera gymnorhiza</i> , <i>Bruguiera parviflora</i> , <i>Ceriops tagal</i> , <i>Dolichandrone spathacea</i> , <i>Excoecaria agallocha</i> , <i>Heritiera littoralis</i> , <i>Lumnitzera littorea</i> , <i>Lumnitzera racemosa</i> , <i>Pemphis acidula</i> , <i>Rhizophora apiculata</i> , <i>Rhizophora samoensis</i> , <i>Rhizophora X selala</i> , <i>Rhizophora stylosa</i> , <i>Rhizophora X lamarckii</i> , <u><i>Rhizophora X tomlinsonii</i></u> , <i>Sonneratia alba</i> , <i>Sonneratia caseolaris</i> , <i>Sonneratia X gulngai</i> , <i>Xylocarpus granatum</i> .	
8 Mangrove Families	
10 Mangrove Genera	
23 Mangrove Species	
3 New Mangrove Records	
200 are of Least Concerned	

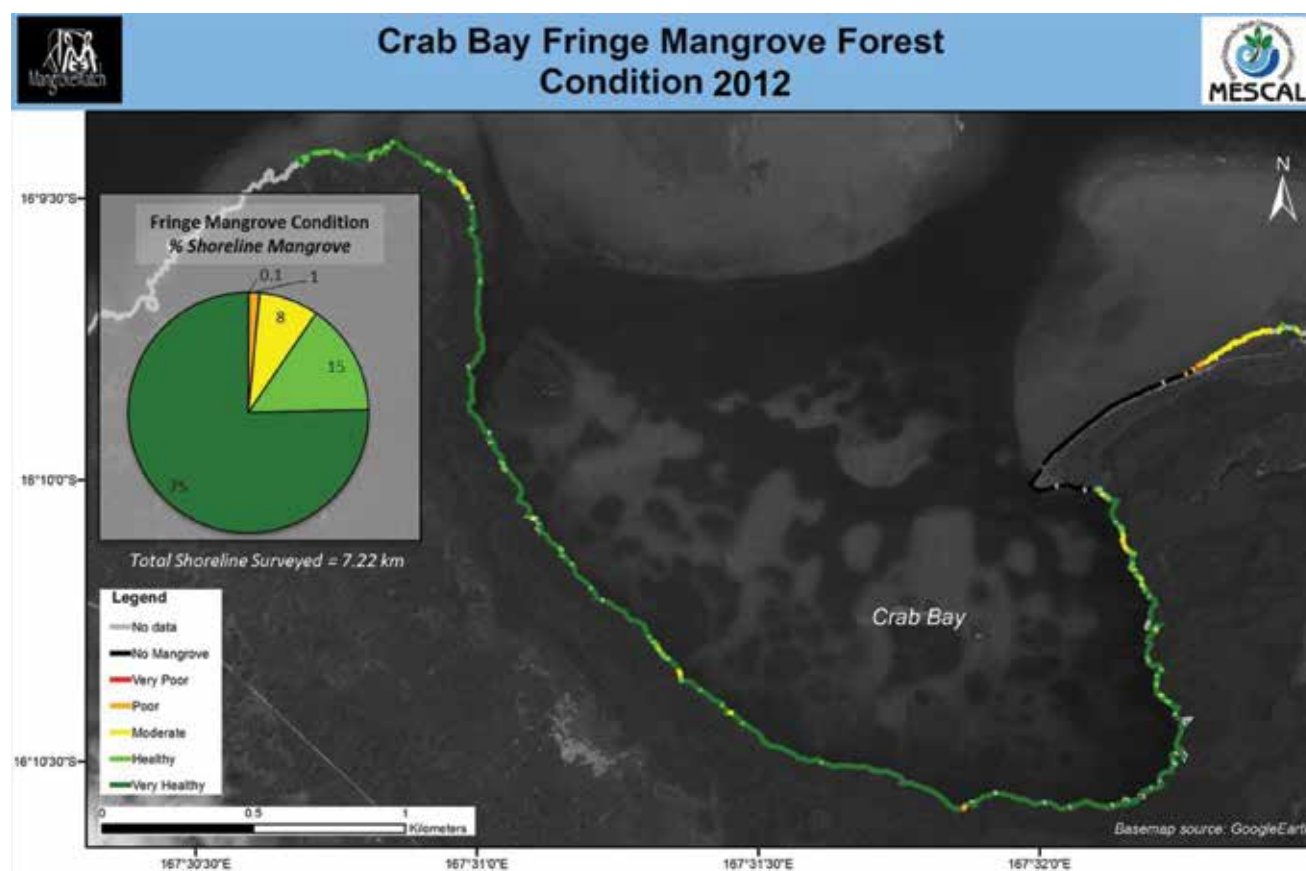


Figure 73: Forest condition Crab Bay fringe mangroves. (Mackenzie et al. 2012)

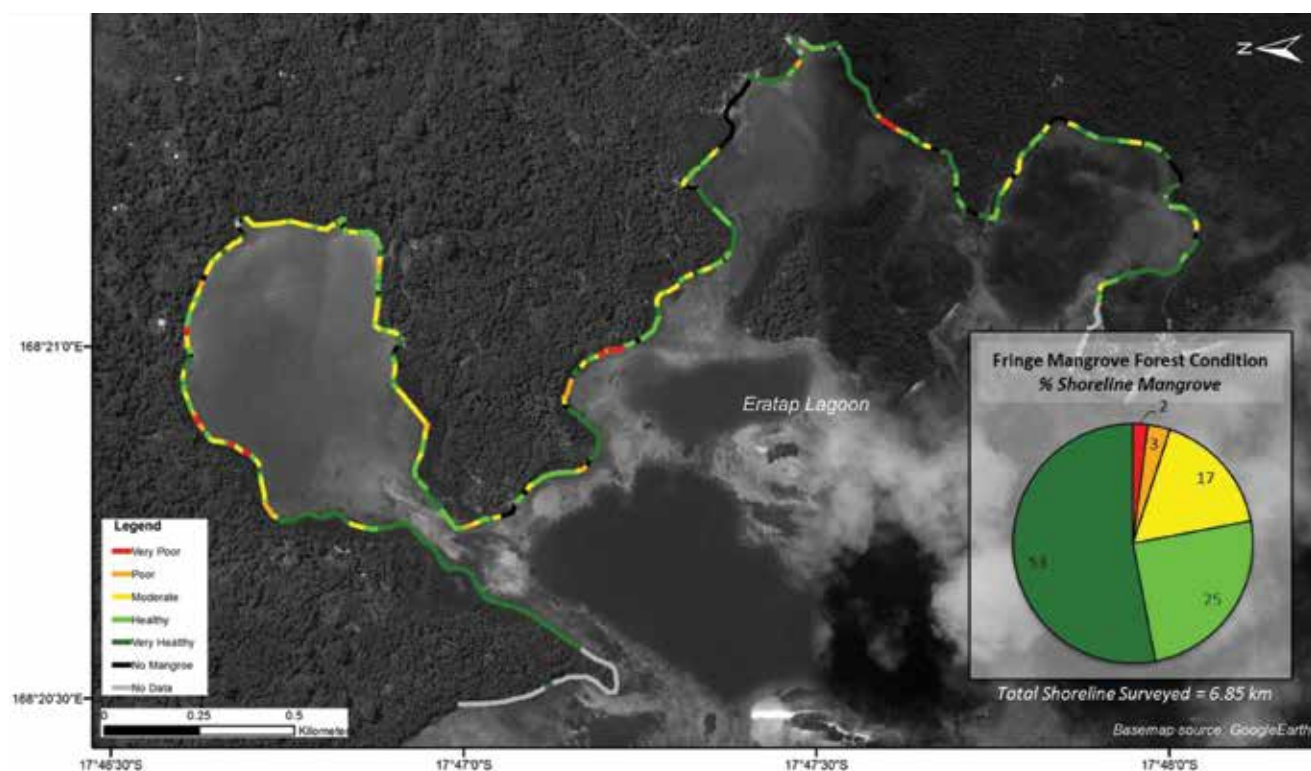


Figure 74: Forest condition, Eratap fringe mangrove. (Mackenzie et al. 2012)

Threats to mangroves come primarily from human activities. During World War 2, approximately 100 ha of mangroves were cleared in Santo to allow the old town located near the Sarakata River to expand towards the Palekula Point (Palka and Pineda 2006). Fortunately, such large-scale impacts are rare. The impacts now are limited to subsistence activities, such as firewood harvesting, or clearing for easier access to the sea. Some mangroves have been converted to coconut plantations, whereas others have been cleared for village settlement.

There is some community-based management of aquatic resources of the mangroves and adjacent coral reefs, under the traditional land and sea tenure system. On special occasions, a partial or complete ban may be imposed on the harvesting of certain resources. For example, in the Port Stanley area, the chiefs would ban the harvest of the *Cardiosoma* crabs for commercial sale during the crab's breeding season. Harvesting for home consumption would be permitted (Lal and Esrom 1990). The Department of Environmental Protection and Conservation also works with the Amal Crab Bay community to establish their community conservation area.

Seagrass

The seagrass communities of Vanuatu have been described by Chambers et al. (1990) who surveyed 60 sites from Aneityum in the south to Ureparapara in the north, and found seagrass beds in 39 of them. Vanuatu holds the greatest diversity of seagrass species alongside Papua New Guinea, both with 13 species (Table 28), (McKenzie et al. 2021). The most widespread species are *Thalassia hemprichii*, *Cymodocea rotundata*, *Halodule uninervis*, *Enhalus acoroides* and *Halophila ovalis*. Dense stands of seagrasses were located at some of the sites surveyed by Chambers et al. (1990), usually in shallow lagoons, bays and intertidal areas. Notable seagrass sites were the wide intertidal areas around the Maskelyne Islands and along the southeast coast of Malekula. While the distribution of seagrass species throughout the Pacific is attributed to currents, carrying seagrass fragments and fruits, other species can be transported by birds or sea turtles. The population of *Ruppia maritima* in Vanuatu aligns closely with those from China and India (Martinez-Garrido et al. 2017).

Table 28: A list of Vanuatu's seagrass species. (Mc Kenzie et al. 2021)

VANUATU'S SEAGRASS SPECIES

Cymodocea rotundata, *Cymodocea serrulata*, *Enhalus acoroides*, *Halodule pinifolia*, *Halodule uninervis*, *Halophila decipiens*, *Halophila ovalis*, *Halophila capricorni*, *Halophila minor*, *Thalassia hemprichii*, *Thalassodendron ciliatum*, *Ruppia maritima*, *Syringodium isoetifolium*.

Wetland Biodiversity

Vanuatu's wetland biodiversity has been a source of food for many communities, and records have shown that many freshwater species were consumed by the early Lapita settlers (Bouffandeau et al. 2019). Many of the rivers and lakes host various endemic and native species including freshwater prawns (*Macrobrachium* spp.), eels and fishes (Table 29), but they are not commonly identified. A list of the known freshwater biodiversity is provided in (ANNEX 9 – Vanuatu Freshwater Biodiversity fauna).

Table 29: Some of Vanuatu's freshwater biodiversity. (Keith et al. 2010)

WETLAND FAUNA PROFILE
67 Freshwater fishes
29 Crustaceans
5 endemic fishes (<i>Akihito vanuatu</i> ; <i>Schismatogobius vanuatuensis</i> ; <i>Sicyopterus aiensis</i> ; <i>Stiphodon astilbos</i> ; <i>Stiphodon kalfatak</i>).
7 are found only in Vanuatu and New Caledonia
1 endemic genus (<i>Akihito</i>)

Estuarine crocodiles *Crocodylus porosus* were once common in parts of Vanua Lava, northern Vanuatu. Numbers started to decline since 1972, due to floods, cyclones and hunting. Recent estimates suggest only 50 individuals left (Bouchet et al. 2011). Rather few species of waterbirds are resident in Vanuatu, which is unsurprising given the relative scarcity of shallow freshwater habitat. Ducks are scarce and rails such as Purple Swamphen *Porphyrio porphyrio* and Spotless Crake *Porzana tabuensis* may be widespread but not conspicuous. A few migratory shorebirds occur around the coast. Dugong (*Dugong dugon*) occur in areas of seagrass associated with fringing flats and shallow bays of several of Vanuatu's islands.

Many other animals associated with Vanuatu's wetlands remain poorly documented, with very little information known. Despite this lack of knowledge, the conditions of many of the wetland areas are being degraded and threatened by agricultural activities, land clearing, natural disasters and invasive species. Three of the main invasive fishes - *Oreochromis* spp., *Gambusia* sp., and *Poecilia* sp. are widespread throughout the country.

Impact

According to Kalfatak and Jaensch (2014), the freshwater wetlands of Vanuatu are currently little disturbed by human activity, but they are likely to come under increasing pressure as populations increase and the development of mining, forestry and agriculture expands. There is already evidence that some of these areas are now much disturbed by urban developments (e.g. Ekasuvat Lagoon). Swamp forests, because of their limited distribution are also likely to be heavily affected. The inadequate disposal of various pollutants, including sewage and solid waste, is resulting in contamination of coastal wetlands. Invasive species such as the tree-smothering rope vine *Merremia peltata* are abundant on some islands of Vanuatu. At least three species of introduced fish occur in Santo and elsewhere including tilapia *Sarotherodon occidentalis*, guppy *Poecilia reticulata* and gambusia *Gambusia affinis* (Bouchet et al. 2011). The introduction of Tilapia has been proposed in the context of food security, however, their adverse impacts on native species and the environment have been documented. Cyclones and volcanic activities are also serious threats to wetlands. Cyclones can destroy vegetation and cause coastal erosion, such as that at Lake Isiwu on Tanna that was destroyed in 1993. Drought conditions can also lead to fires in some of the wetlands.

Perhaps one of the biggest threats to wetlands are human encroachment and unregulated developments especially in mangrove areas. Large swathes of Vanuatu's mangroves were removed during World War 2 to expand the town (Palka and Pineda 2006). Harvesting of mangroves for fire wood and other domestic use, and access to and from the shoreline are other localised impacts of mangrove forests. As the country's population increases, it is anticipated that the demand for local resources will also increase. This will affect natural resources and biodiversity.

Response

Considerable progress on wetland conservation has occurred in Vanuatu in the 20 years since the 1993 edition of the Directory. Dahl (1980) and others (TCSP 1990) had recommended a representative reserve system and highlighted some important wetlands such as Duck Lake. However, the situation did not change greatly until the mid-1990s when initiatives on 'conservation areas' supported by SPREP and GEF took effect. Conservation areas were not established as protected areas typical of European models; rather, they were set up in key areas of biodiversity where local land and resource owners agreed to meet conservation goals concurrent with maintaining sustainable livelihoods.

National legislation including the Environmental Protection and Management Act prescribes the arrangements for conservation areas in Vanuatu and landholders can register them, giving controls on access and resource exploitation.

Some Conservation Areas (CAs) in Vanuatu include important wetlands identified in the 1993 edition of the Directory:

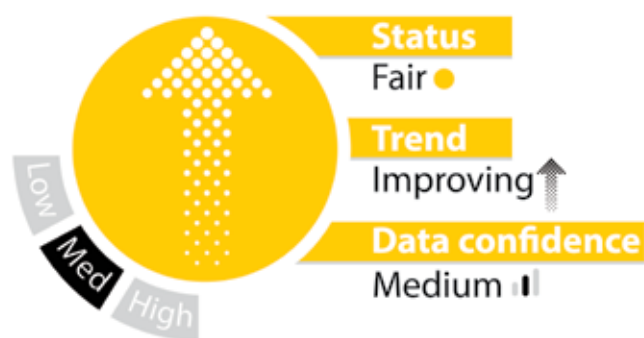
- Vathe CA: included a large part of the Jordan River Floodplains site.
- Amal – Crab Bay CA and Uri-Narong Marine CA: are parts of the Port Stanley,
- Bushmans Bay and Crab Bay site.
- A small conservation area is included in the Port Sandwich, Cook Bay and Maskelyne Islands site.

The protection of some of the wetlands has been achieved through community conservation areas, placing a moratorium on forest logging, strengthening legislation, empowering community management, and restricting harvesting and targeting of vulnerable species.

Recommendations

- Ensure there is a well-supported surveying and monitoring programme for some of the country's unique wetland areas. Given the limited resources, prioritising wetland areas could assist to ensure a representative outcome for the state of wetlands in Vanuatu.
- The value of wetlands remains to be fully understood, therefore there is an urgent need to undertake an economic and social valuation of some of the country's wetlands, and with the urgency of climate change assess the contribution of wetlands from a carbon sequestration perspective.
- Raise awareness and encourage communities to protect and conserve wetland areas so that they continue to provide for future generations. Value of wetlands by communities. Take advantage of the World Wetland Days as a standalone to give it more recognition. Awareness interlinkages between wetlands and other ecosystems.
- Strengthen wetland legislation, including enforcing EIA requirements and ensure sufficient resources for their implementation.
- Encourage more research and understanding of wetlands and their biodiversity and the interactions with other ecosystems and communities.
- There is a need for periodic updating of Vanuatu's wetland inventory to allow for up to date knowledge on the state of the country's wetlands.
- Where feasible, encourage more sites to be designated under the Ramsar Convention.
- The introduction of invasive species, especially aquatic invasive species, reduce of the quality of the wetlands. The removal of aquatic invasive species is recommended.
- The threat of climate change to wetlands is real, where invasive species have been spread during flooding and severe cyclonic conditions. There is an urgent need to safeguard vulnerable wetland systems from invasive species.
- There is an urgent need to draft regulations for the management of mangroves under the EPC Act.

3.4.3 Environmental Invasive Species



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	 6.6 15.1, 15.5	 Convention on Wetlands Convention on Biological Diversity 	SAMOA Pathway 58 (e), 95 (a-c)	National Sustainable Development Plan ENV 4; 5 National Environment Policy and Implementation Plan – 3.1 Policy Objective 1.3 National Biodiversity Strategy and Action Plan 2018-2030 Strategy Area 5 National Invasive Species Strategy and Action Plan 2014-2020

Indicator Definition

Invasive species have significant impacts on Vanuatu's economy, biodiversity, human health and culture (DEPC 2015). Vanuatu's endemic species are threatened with extinction by invasive species such as the ship rat (*Rattus rattus*) which preys on the eggs and chicks of many birds and lizards. The extinction of the Tanna Ground Dove is attributed to rats. This indicator assesses the status of invasive species management in the country.

Status and Key Findings

Over 200 introduced animal and plant species are present in Vanuatu. While most have not caused much harm to the environment, a few are highly invasive causing environmental and economic harm. Of the 100 of the World's Worst Invasive Species, 27 are found in Vanuatu – see Table 30 (Lowe et al. 2004).

Table 30: Introduced species reported to be in the 100 of the World's Worst Invasive Species found in Vanuatu. (NISSAP 2014)

VANUATU'S 27 OF THE WORLD'S WORST INVASIVE SPECIES
Malaria, Water Hyacinth, African Tulip Tree, Brazilian Pepper Tree, Cogon Grass, Koster's Curse, Kudzu, Lantana, Leucaena, Mile-a-Minute, Wedelia, Big-Headed Ant, Yellow Crazy Ant, Snail Eating Flatworm, Giant African Snail, Little Fire Ant, Rosy Wolf Snail, Sweet Potato Whitefly, Mozambique Tilapia, Western Mosquito Fish, Indian Mynah, Feral Cat, Feral Goat, Mouse, Feral Pig, Ship Rat, Rabbit.

A concerted effort to survey the extent of invasive weed problems by the Biosecurity Vanuatu and DEPC has found over 1400 infested sites (Figure 75 and Figure 76). The majority of the infested sites are on Efate and Santo islands. These islands are the gateway to international trade and arrivals, which may explain the high number of infestations. Machinery brought in for earth works may be a vector for some of the introduced weeds. It has been suggested that this may be the pathway for the introduction of the Coconut Rhinoceros Beetle, which can decimate coconuts throughout the country. With more invasive surveys being carried out, the number of infested sites continues to grow. Management actions will be required to control and, where possible, eradicate the invasive species.

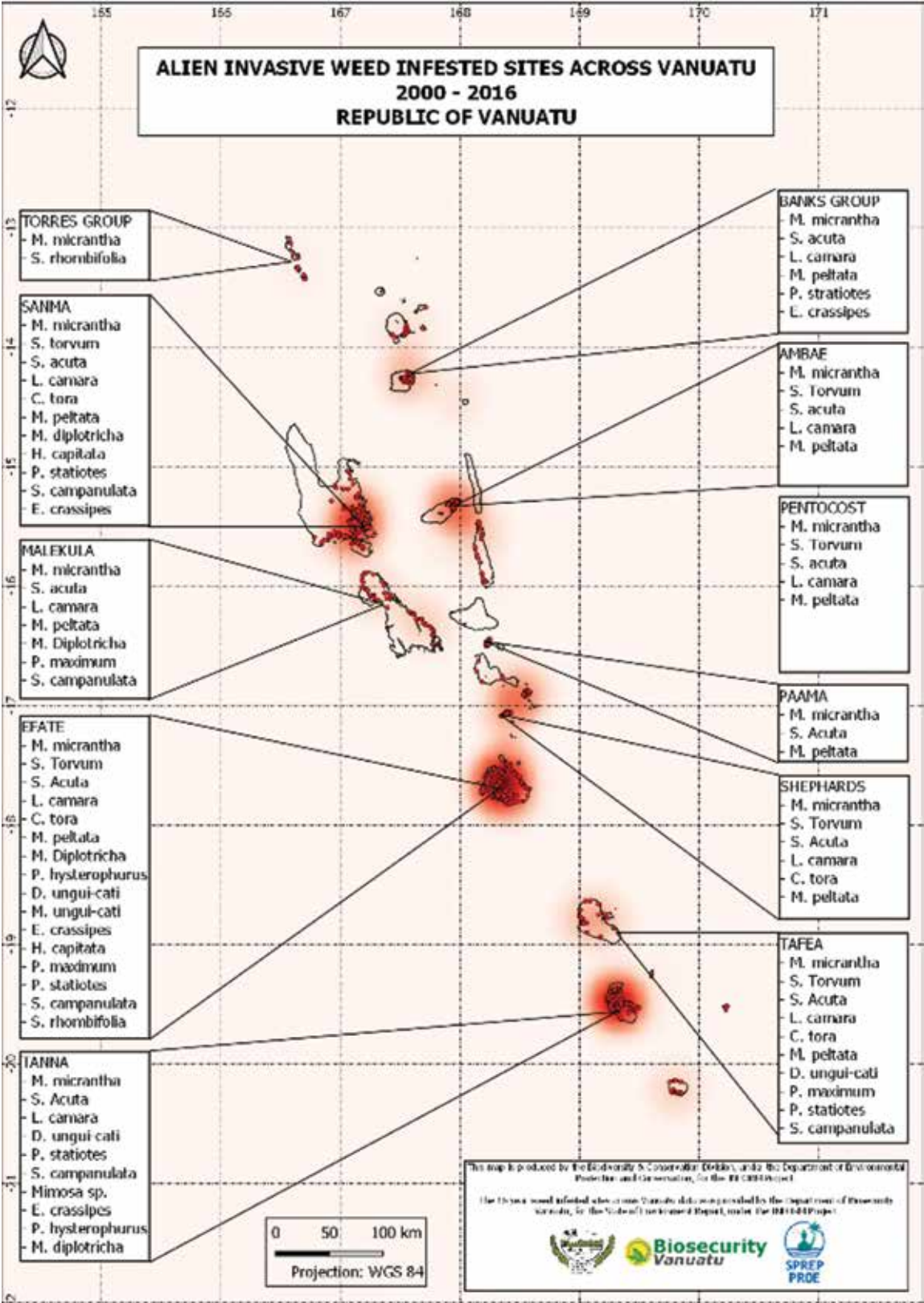


Figure 75: Surveys of invasive weeds throughout Vanuatu, with almost all islands being infested. (DEPC)

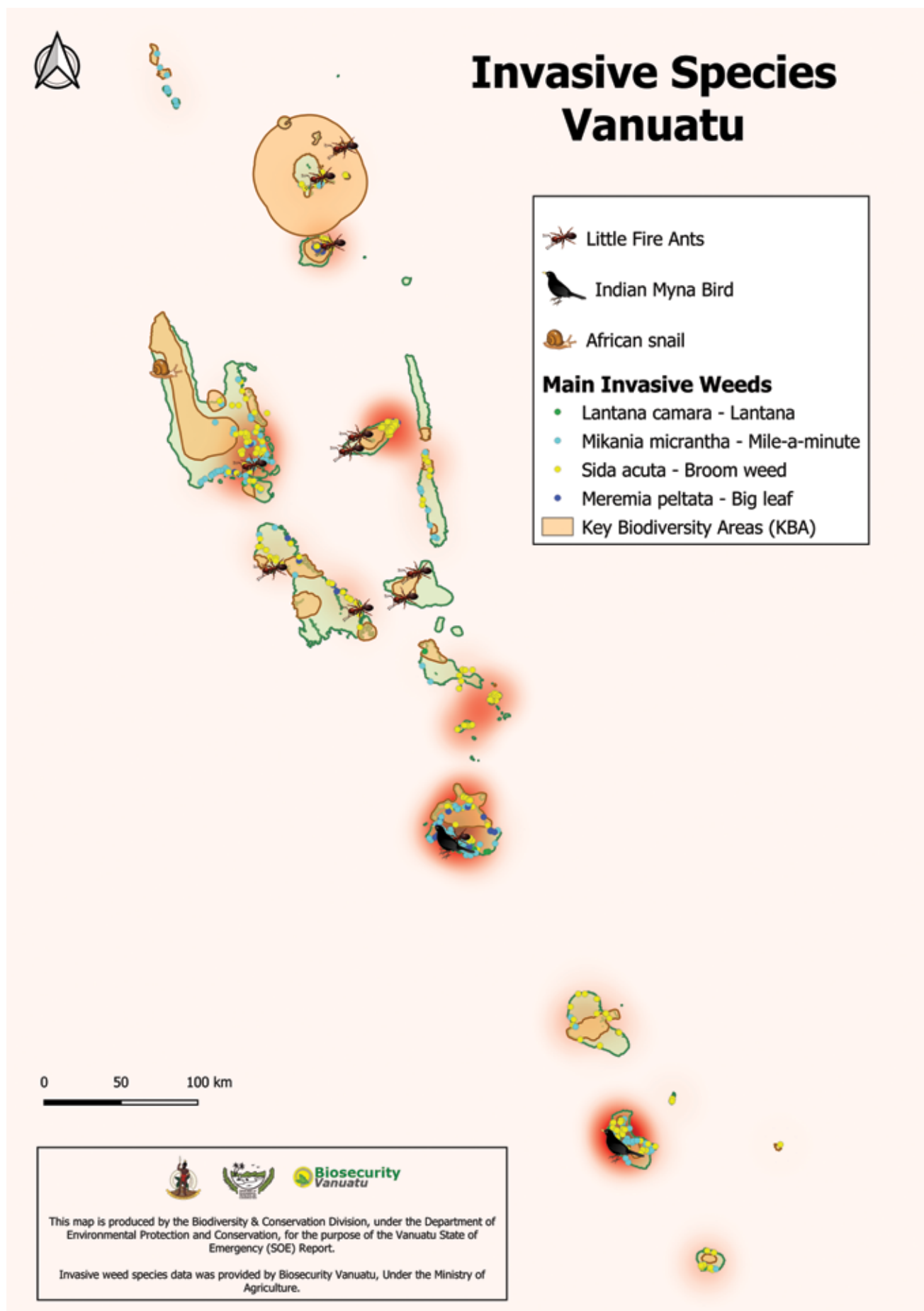


Figure 76: Surveys of some of the targeted invasive species in Vanuatu. (DEPC & Biosecurity Vanuatu)

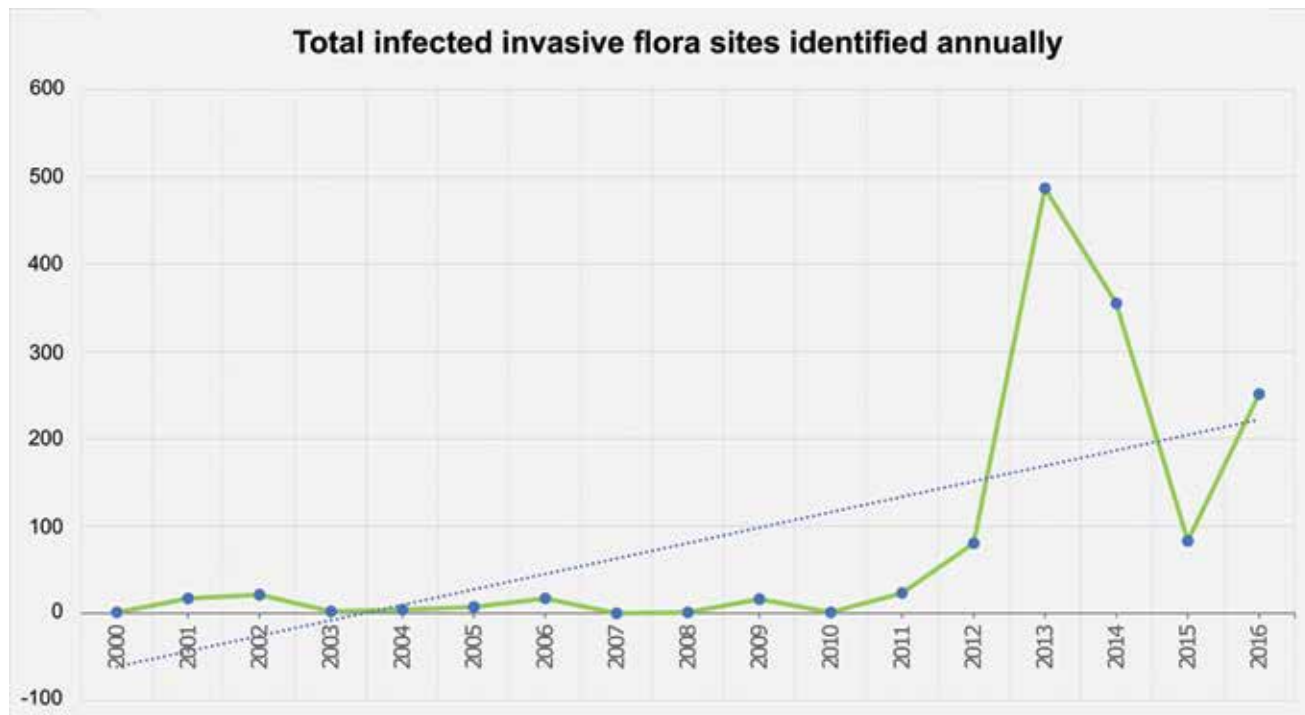


Figure 77: Surveys of eight priority invasive species from 2000 to 2016, showing the increasing number of infested sites. (DEPC)

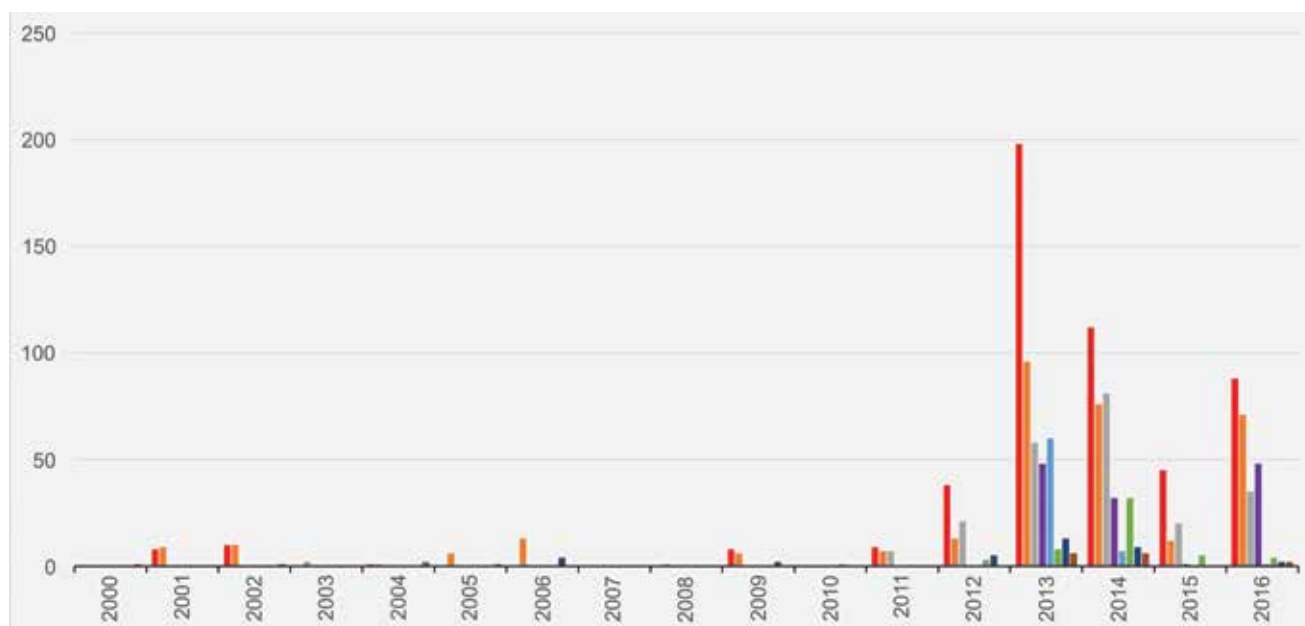


Figure 78: 2000 to 2016 surveys of eight priority invasive species revealed an increase in the number of affected sites.

The degradation of the environment due to extreme weather events and pollution has also resulted in an increase in infestation and spread of invasive species. After Cyclone Pam in 2015, locals observed the rapid growth of *Mikania micrantha*, *Sida acuta*, *Lantana camara*, *Merremia peltata*. Some of these invasive vines (*M. micrantha* and *M. peltata*) overwhelm and shade out forest trees causing them to die (DEPC 2018). Other invasive shrubs and trees quickly spread to cultivated lands, which require expensive chemical treatment for the land to be managed.

A suite of measures to manage Vanuatu's invasive species included the use of biological control (Biocontrol). Biocontrol was first used in 1935 with the introduction of the tingid *Teleonemia scrupulosa* to control *Lantana camara*. To date, 10 biological control agents have been introduced to control eight invasive weeds (Day and Bule 2016). The effectiveness of the biocontrol has been mixed with *Calligrapha pantherina* introduced to control *Sida acuta* and *Sida rhombifolia* being the most effective.

Biocontrol agents have also effectively controlled waterweed species (*Pistia stratiotes* and *Eichhornia crassipes*). The fungus *Puccinia spegazzinii*, introduced to control *Mikania micrantha* in over 150 sites, covering 25 islands has been established in over 50 sites on seven islands. Following up on the spread and the impact of the rust is recommended (Day and Bule 2016). The invasive Lantana shrubs continue to spread despite the introduction of two biocontrol agents.

Table 31: The status of biocontrol agents and their target invasive weed species. (Day and Bule 2016)

INVASIVE SPECIES (SCIENTIFIC & COMMON NAMES)	BIOCONTROL AGENT	YEAR OF RELEASE	ESTABLISHED	IMPACT
Pistia stratiotes (Water lettuce)	Cleoptera: Curculionidae Neohydronomous afinis	2006	Yes	Variable
Mikania micrantha (mile-a-minute)	Pucciniales: Pucciniaceae Puccinia spegazzinii	2012	No	None
Parthenium hysterophorus (Famine weed)	Coleoptera: Chrysomelidae Zygogramma bicolorata	2014	No	None
Mimosa diplotricha (Giant Sensitive Weed)	Hemiptera: Psyllidae Heteropsylla spinulosa	1994	Unknown	Unknown
Sida acuta (Wire Weed)	Coleoptera: Chrysomelidae Calligrapha pantherina	2005	Yes	High
Sida rhombifolia (Arrowleaf Sida)	Coleoptera: Chrysomelidae Calligrapha pantherina	2005	yes	High
Eichornia crassipes (Water Hyacinth)	Coleoptera: Eirrhinidae Neochetina bruchi	2013	yes	Still Validating
	Neochetina eichhorniae	2004	yes	High
Lantana camara (Lantana)	Hemiptera: Tingidae Teleonemia scrupulosa	1935	yes	Slight
	Coleoptera: Chrysomelidae Uroplata girardi	1983	yes	Slight

For non-plant invasive species, chemical controls are considered the most effective methods, although the application has been ad hoc and sporadic. Three species in particular (Mynah, Giant African Snail and Crown-of-thorns starfish) have been targeted on a project-based approach (Table 32). A collaborative partnership between DEPC and a local pest control company to manage Mynah saw actions across Malekula, Santo and Efate. Schools were also targeted to assist with the project. The challenge for some of these project-based activities is that when the project winds up, efforts are also wound up. Over the past few years, DEPC have addressed this shortcoming by recruiting dedicated staff to deal with this challenge.

Table 32: Invasive animals and their management. (DEPC)

Invasive Species	Biocontrol agent	Impact
<i>Acridotheres fuscus</i> , <i>A. tristis</i> (Mynah Birds)	Chemical control solution introduced with DEPC working in coordination with a local pest control company.	Effective
<i>Lissachatina fulica</i> (Giant African Snail)	Chemical controls available and sold at retail outlets.	Effective
<i>Acanthaster planci</i> (Crown of Thorns Starfish)	Physical hand removal Injection with lemon extract	Effective

Impacts

Considered as a major threat in Vanuatu, invasive alien species over the years have had substantial impacts on the country's native species through destruction and degradation of their natural habitats (in both terrestrial and marine ecosystems) and having a direct or indirect impact to the country's agriculture, tourism, biodiversity, and ecosystem services.

Response

Vanuatu has two key agencies that are responsible for managing invasive species: Biosecurity Vanuatu and the Department of Environmental Protection and Conservation with their key roles being:

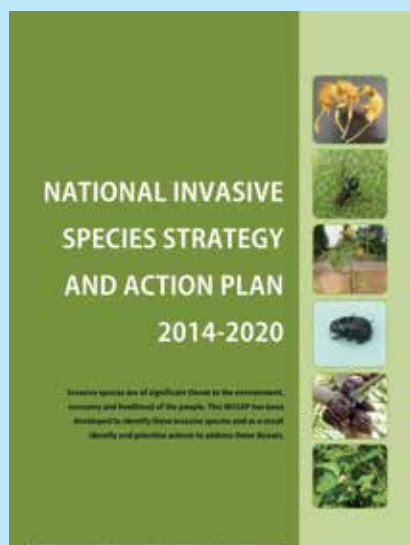
- Biosecurity Vanuatu: Mission is to protect Vanuatu's borders against the introduction and spread of foreign pests and diseases that could affect crops, animals, humans and the environment, and to enhance trade of Vanuatu products. The Department works under a number of different legislations including the Plant Protection Act, Animal Importation and Quarantine Act, Animal Disease (Control) Act and the Meat Industry Act. A proposal for a Biosecurity Act is in the plans. Some of the activities of BV include screening of all incoming passengers, crafts and goods to prevent the introduction of pests, eradicate and/or manage new regulated pest incursions and manage regulated pests that have been established in the country. Biosecurity Vanuatu has a National Biosecurity Policy 2016-2030.
- DEPC: Mission and Vision is leading the country towards a clean, resilient and sustainable environment. The Department works under a number of legislations with the key being the Environmental Protection and Conservation Act, the Environmental Impact Assessment Regulations, National Parks Act, International Trade (Flora and Fauna) Act and Regulations, Waste Management Act, Pollution (Control) Act and Ozone Layer Protection Act and Regulations.

Other agencies including the Health Department, the Agriculture Department, the Department of Fisheries and the Ports Authority have important roles to play in the collection of data, the detection and to a certain extent the management of incursions.

Biosecurity Vanuatu and DEPC both have action plans that involve managing weed infestations. The limited resources (human and financial) mean that only priority invasive weeds are being addressed.

A National Invasive Species Strategy and Action Plan (NISSAP) was developed by the National Invasive Species Taskforce with support from the Global Environment Facilities and SPREP.

Vanuatu's National Invasive Species Strategy and Action Plan (NISSAP) 2014-2020



A national plan to address invasive species management in Vanuatu following the Pacific islands regional plan in managing invasive species. These actions include Generating Support; Building Capacity; National Policies and Legislation; Baseline and Monitoring; Prioritisation; Research on Priorities; Biosecurity; Management of established invasives; and Restoration

Vanuatu's National Invasive Species Strategy and Action Plan (NISSAP) lists 27 invasive species that are a priority for the country to address, mostly through the use of biocontrol. Biosecurity Vanuatu in collaboration with the Queensland Government, Australia have released nine biocontrol agents to prevent eight of the top weed species (Table 32) (Day and Bule 2016). The *Merremia peltata* or the Big Leaf Vine is being managed using chemical control agents. The Plan has resulted in over 20 projects addressing invasive species, primarily by focusing on certain problem species, including a delimiting survey of the Little Fire Ants, Coconut Rhinoceros Beetle, *Mimosa diplotricha*, African Tulip, and improving GIS mapping of invasive species.

Vanuatu 2030 - National Sustainable Development Policy (Vanuatu 2030)

The Vanuatu 2030 prioritizes the environment under the Environmental Pillar (ENV 5), specifically on Ecosystem and Biodiversity. One of the activities of the ENV 5 is to establish a national committee for the conservation and sustainable management of biodiversity and ecosystems.

The ENV 5 Policy Objectives are:

- to protect biodiversity and ecosystems and their significant role in culture, society and environment
- create and manage conservation and protected areas
- support local conservation and protection of endangered, threatened or endemic species and ecosystems including through traditional knowledge and practices
- protect borders and the environment through effective customs and biosecurity services.
- increase awareness on biodiversity conservation and environmental protection issues across government and public
- enhance environmental monitoring, evaluation and research with relevant, open and transparent data sharing among relevant agencies

National Environment Policy and Implementation Plan

Policy Objective 1: P01.3. Facilitate and guide the protection of the biodiversity and livelihoods of Vanuatu from the impacts of invasive species through strong collaboration.

Table 33: Invasive species objective and actions under the National Environment Policy and Implementation Plan 2016-2030. (DEPC 2017)

POLICY OBJECTIVE	TARGET	Activities	Indicators	Key Partners
Facilitate and guide the protection of the biodiversity and livelihoods of Vanuatu from the impacts of invasive species through strong collaboration (NSDP ENV 5.4)	1.3.1: By 2024, 90% of the NISSAP is implemented	a) Refer to chapter 8 (Action Plan) of the NISSAP	Proportion of NISSAP implemented	DEPC, DoF, VFD, DARD, DGMWR, VKS, VNCC, DoL, SLO, BV, PGCs, communities, NGOs, CSOs, CDU, Tourism, SPREP, MSG Secretariat, PSC, MFEM, DoPM, SPC, DoH, VMGD, IRD, BNZ, AQIS, FAO, DL, Landcare
		b) Annual monitoring of NISSAP progress		
		c) Recruit Biosafety and Invasive Species Officer in 2017	Invasive species and biosafety officer appointed	
		d) Finalise Draft Biosecurity Bill	Biosecurity Bill passed	
		e) Develop MoU between DEPC, BV and Customs	MoU signed	
	1.3.2: By 2021, a revised NISSAP is complete	Review NISSAP and prepare revised NISSAP	Revised NISSAP approved	DEPC, DoF, VFD, DARD, DGMWR, VKS, VNCC, DoL, SLO, BV, PGCs, communities, NGOs, CSOs, CDU, Tourism, SPREP, MSG Secretariat, MFEM, DoPM, SPC, DoH, VMGD, IRD, BNZ, AQIS, FAO, DL, Landcare

Vanuatu's National Biosecurity Policy 2016-2030

The policy was established to set the overall direction on managing pests, diseases and weeds that may affect the agriculture sector and the environment. The Policy has a strong focus at the points of entry for international arrivals, as well as establishing effective monitoring and surveillance systems. Key strategic areas of focus include legislation, emergency response, capacity building, and providing adequate resources and facilities.

Live & Learn Environmental Education

A non-governmental organisation that is part of an Asia-Pacific learning network, with the aim of reducing poverty and advancing sustainable development through education and learning. The organisation works with many national, regional and global partners to develop tools and offer training and resources to assist with its mission. One of the many resources the organisation has developed are invasive species field guides that include species identification and management options (Figure 79, Figure 80, Figure 81).

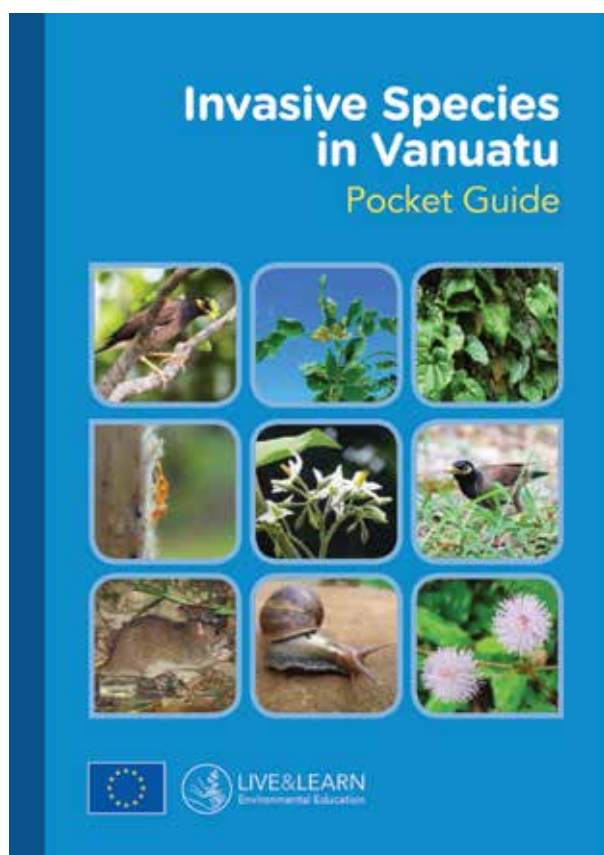


Figure 79: A pocket guide on invasive species in Vanuatu. (Live & Learn Environmental Education)

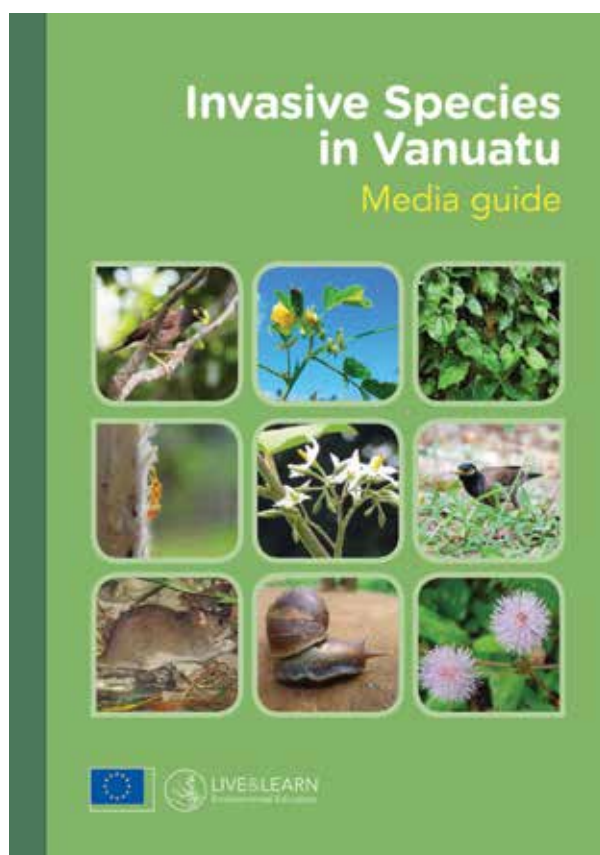


Figure 80: A media guide on invasive species in Vanuatu. (Live & Learn Environmental Education)

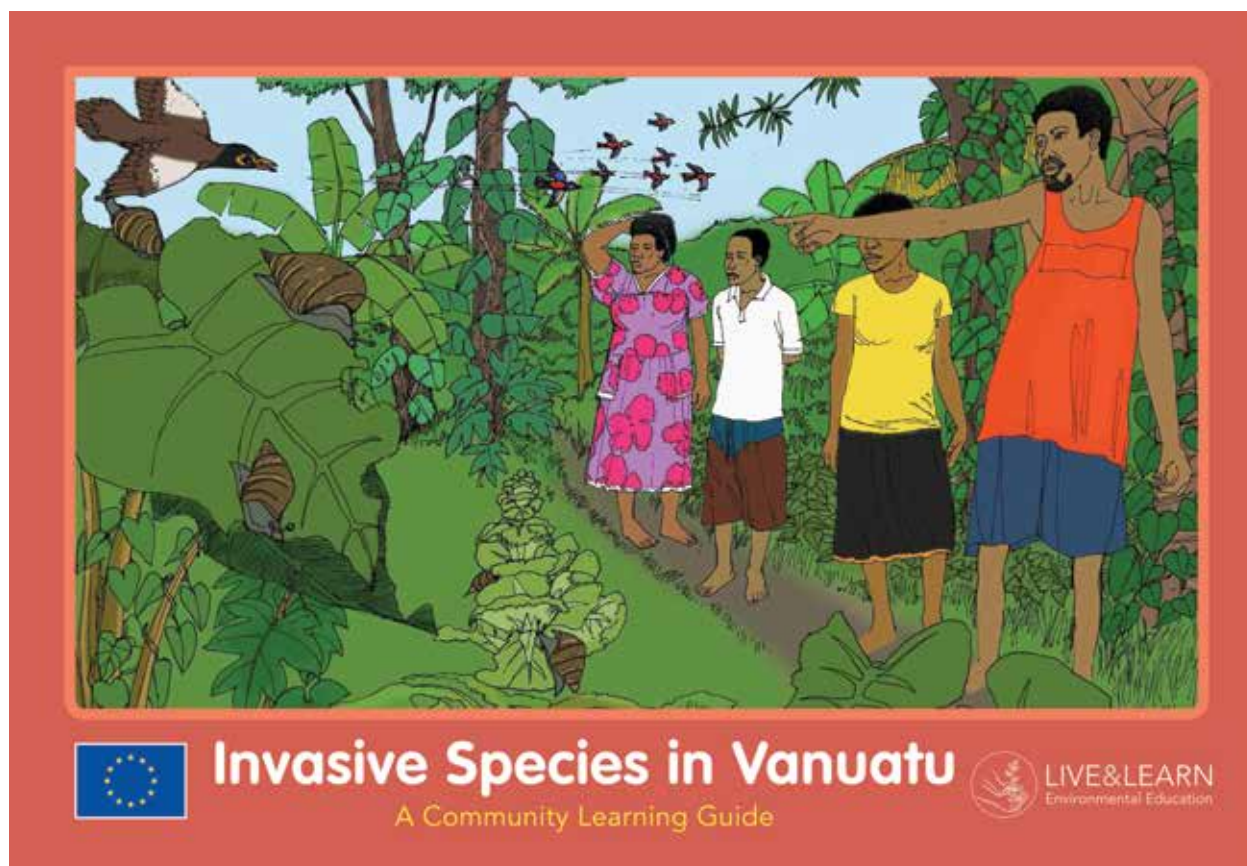
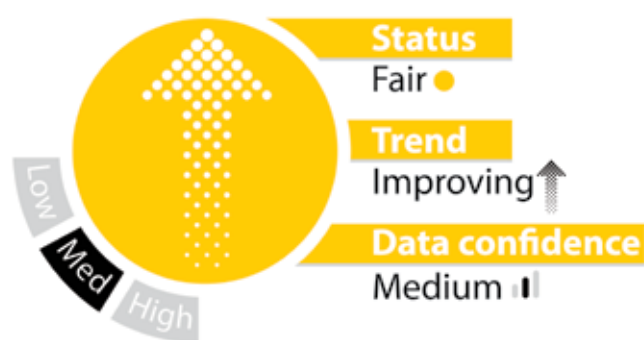


Figure 81: Public awareness materials on invasive species in Vanuatu (Live & Learn Environmental Education)

Recommendations

- The Biosecurity Bill needs to be passed as soon as possible to ensure that all biosecurity matters are governed under one legislation. This will help execute actions to contain and prevent the spread of invasive species throughout the country. Domestic biosecurity measures will need to be developed.
- The current National Invasive Species Strategy and Action Plan concluded in 2020. It now needs to be reviewed and updated, ensuring that a strong action plan is in place and that priority invasive species are addressed.
- A monitoring, surveying and data collection programme needs to be implemented to keep track of invasive species distribution and management. The database should also be reviewed and where appropriate updated.
- Use new technology to map the spread of invasive species and to apply the necessary management actions should be explored.
- Continue to build the capacity of Biosecurity Vanuatu and DEPC staff, as well as other stakeholders, so that effective and strong actions are undertaken to manage invasive species.
- Awareness programmes must continue to ensure that the entire country is aware of the significant impacts of invasive species and know who to report to or get more information from.
- Sustainable financing streams for invasive species programmes must be developed and secured.
- The pathways for invasive species primary and secondary introductions must be reviewed and identified so that management actions can be applied to prevent new introductions.
- Marine invasive species are poorly understood; more work needs to be carried out to improve knowledge on the current status of marine invasive species.
- The National Invasive Species Technical Advisory Coordinating Committee is the national body that is task with implementing the NISSAP. Support is needed to ensure that NISTACC continues to provide the advice and oversight on invasive species issues in the country.

3.4.4 Conservation and Protected Areas



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 58 (o)	National Sustainable Development Plan ENV 4; 5
				SPREP Convention	NEIP Objective 2
				Noumea Convention	
					
		6.6 12.2 14.2, 14.5 15.1, 15.2, 15.5			

Indicator Definition

This indicator focuses on terrestrial protected and conservation areas (including inland wetlands), but recognising that some of the areas straddle both the terrestrial and the marine environment. Marine conservation areas are discussed in Theme 3: Marine and Coast. The assessment focuses on the number of community conservation areas, the total size of areas being protected and conserved and the level of management being applied.

Status and Key Findings

The concept of conservation areas for safeguarding resources is not new to Vanuatu. Traditionally, village chiefs and landholder families managed resource use on behalf of their communities in accordance with locally defined custom law. As elsewhere, colonisation and independence have contributed to many changes in Vanuatu. While kastom still defines people's relationships with their land, there is considerable local variation to which custom controls on resource use are practiced, enforced and respected (Vilvil-Fare 2006). There have also been many changes in the ways natural resources are used. There are significant pressures from other countries with influence in the region, from international organisations, from national leaders and from young, educated people to continue to change people's relationship with the environment (Vilvil-Fare 2006).

The modern top-down approach of creating protected areas as national parks has not yielded success in Vanuatu, perhaps due to lack of support and engagement from communities. This in part reflects the limitations of conventional protected area approaches in a context of customary land ownership, resource tenure and limited government capacity.

The Department of Environment Registry Database on Protected Areas in Vanuatu lists nine formal protected areas, covering 232 km² or 2% of the total land area (12,189 km²) (Table 34). The Vanuatu Conservation Registry listed 161 (formal and informal) Community Conservation Areas, which consist of both marine, inland freshwater and terrestrial areas (Table 19). The Registry also includes areas that are formally declared by the government as well as areas that are traditionally managed by the chiefs as well as the nominated Ramsar Site and the Cultural heritage site.

While these conservation areas are formalised through legislation, they are typically managed by or in collaboration with local communities. Many of these sites are now managed using a combination of modern science and traditional management approaches. The value of traditional knowledge, traditional resource management and traditional management and governance has been empowered and encouraged.

The buy-in from communities is a driving force for the rapid increase in community conservation areas. The fact that areas are not locked up permanently, but are used in a sustainable manner has been a key factor in the community’s engagement. The Department of Environmental Protection and Conservation register all the community conservation areas in accordance with the legislation.

Table 34: Community Conservation Area Profile. (DEPC 2022)

TERRESTRIAL COMMUNITY CONSERVATION AREAS
Total Land Area – 12,190 km ²
Total Land Area Conserved – 418 km ²
% of Land Protected – 3.4%

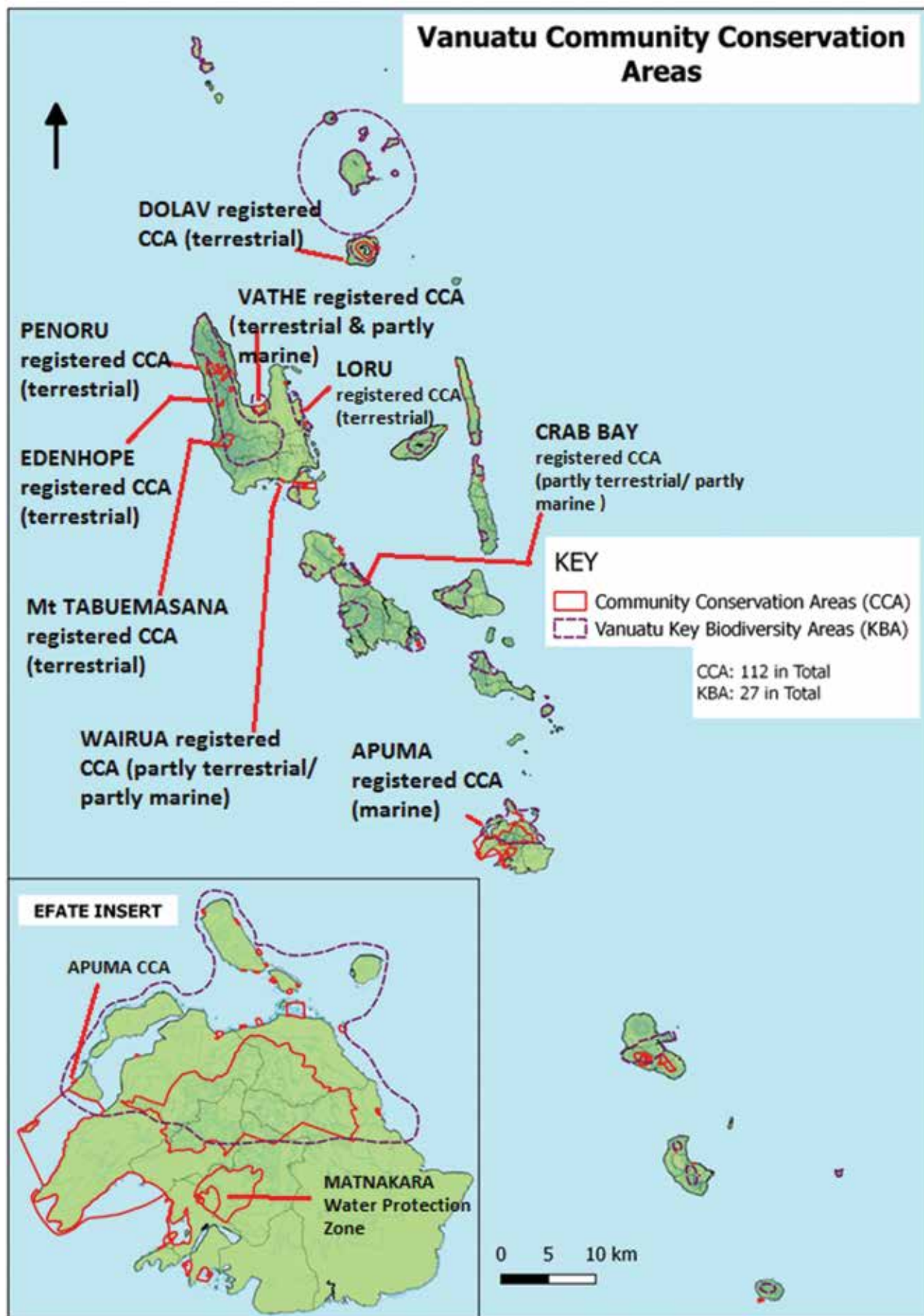


Figure 82: Map of Protected Areas or Conservation Areas; tabu areas, traditional resource managed areas, Community Conservation Areas and KBAs. (DEPC 2021)

Impacts

Protected areas are an important management tool to help with species recovery and enhancement, as well as safeguarding the ecological services for the benefit of Vanuatu communities. When there is no conservation or protection of resources, it can easily lead to over-harvesting and exploitation, or the tragedy of the common. This will also affect traditions and kastom, especially if some of the sites have strong affiliation with historical events.

Response

The Aichi Targets recommends each contracting party to designate at least 17% of their terrestrial environment for conservation. The National Sustainable Development Plan (NSDP) and the National Environment Policy and Implementation Plan have national targets of 15% of forests; and 10% of wetlands, to be protected by 2030. As most of the land belongs to traditional owners, engaging with them is the key in achieving these national and global aspirations. Some local and international non-governmental organisations are collaborating with the Government departments to assist communities in the protection and conservation of their biodiversity. One of the key purposes of establishing protected areas is for the conservation of biodiversity, culture and customary sites, and to reduce adverse impacts from climate change and associated natural disasters. This has led to the establishment of the Santo Sunset Environment Network with their work in the conservation of the Western Santo Mountain Chain, which is a Key Biodiversity Area (KBA) – (see <http://www.SantoSunset.org>).

Prior to 2020, some national targets were established, such as 90% of community management committees complying with their Community Conservation Areas, and 10 registered CCAs by 2020.

Vanuatu's PA network has an important role to play in terms of biodiversity conservation and provisioning of ecosystem services (particularly safeguarding the fish stocks upon which local livelihoods and food security depend). Protected areas are also important from a climate change perspective and a linkage to traditions and customs of Vanuatu. While Vanuatu has successfully established a network of PAs with both terrestrial and marine components, and compliance with PA regulations appears high, there are gaps in terms of management capacity, monitoring and enforcement. If these are not addressed, the long-term effectiveness of these PAs may be jeopardised.

Currently, there is a strong drive to establish new protected areas in the country. The outcomes from this will be reported on in the next SOE Report.

Recommendations

- Undertake a comprehensive review of the Community Conservation Areas Registry to ensure that the information is up-to-date and informative. This should include the name of the CCA, the island, the size, and any features that makes the site unique. This information should also be fed into global systems, such as the World Database on Protected Areas, to assist reporting on global protected area targets.
- Identify gaps and challenges to effective management of the areas. Encourage communities to develop management plans for their respective sites.
- Using signage to demarcate the boundaries should help communities and visitors to adhere to the rules and other management actions of the CCA.
- Review relevant legislation to ensure that adequate legal support is offered to communities in their efforts to protect and conserve their CCAs.
- Encourage the development of management plans and communicate the plans to all stakeholders and the public.
- Continue to monitor and encourage research by local students and researchers to enhance knowledge and management actions.
- PA effectiveness should be monitored.
- Identify important areas that need protection driven by biodiversity assessment – rather than an area that communities want protected? Work with communities to conserve sites.
- KBAs – need to be reassessed – due to new global criteria which will help prioritise conservation effort in the next five years.

Biodiversity References

- Andersen, M.J., Fatdal, L., Mauck III, W.M. & Smith, B.T. 2017. An ornithological survey of Vanuatu on the island of Efate, Malakula, Gaua and Vanua Iava. Check list the Journal of Biodiversity Data. 13(6): 755-782: <https://doi.org/10.15560/13.6.755>
- Baereleo, R., Kalfatak, D., Kanas, T., Bulu, M., Ham, J., Kaltavara, J., Sammy, E., Dovo, P., Duke, N., MacKenzie, J., Sheaves, M., Johnston, R., & Yeun, L. 2013. Mangrove Ecosystems for Climate Change Adaptation and Livelihoods (MESCAL). Biodiversity Assessments Technical Report (Eratap and Amal/Crab Bay). Edited by Waqalevu, V.P. 144p.
- Bani, E., & Esrom, D. 1993. Republic of Vanuatu. Wetlands. Vanuatu. 25p.
- BirdLife International 2022. IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 24/05/2022.
- Bouffandeau, L., Bearez, P., Keith, P., & Bedford, S. 2019. Freshwater fishing among Lapita people: The Sleepers (Teleostei: Eleotridae) of Teouma, Vanuatu. Journal of Archaeological Science: Reports 26 (4).
- Bregulla, H. 1992. Birds of Vanuatu. Anthony Nelson. Oswestry, England. 329 p.
- Brown, W.C. 1991. Lizards of the Genus *Emoia* (Scincidae) with Observations on their evolution and biogeography. Memoirs of the California Academy of Sciences. 15. California Academy of Sciences and the Christensen Research Institute. Pp. 1-94.
- CEPF (Critically Ecosystem Partnership Fund). 2012. Ecosystem Profile. East Melanesian Islands Biodiversity Hotspot. University of the South Pacific, Conservation International and University of Papua New Guinea. vi + 237 p.
- Chambers, M.R. 1992. Introduction. In: Bregulla, H., Guide to the Birds of Vanuatu. Anthony Nelson, Oswestry, U.K.
- Chambers, M.R., & Bani, E. 1988, Wildlife and Heritage Conservation in Vanuatu, In: Chambers, M.R., & Bani, E. (Eds). Vanuatu-Resources Development Environment, Proceedings of a Conference held in Port Vila, Vanuatu, 24-25 September 1987: 124-133.
- Chambers, M.R., Bani, E., & Barker-Hudson, B.E.T. 1989. The status of dugong (*Dugon dugon*) in Vanuatu.
- Corbara, B., & Fores, B.R. 2011. A brief history of biodiversity exploration and scientific expeditions on and off the Island of Santo. ResearchGate. : <https://www.researchgate.net/publication/280638239> (access Aug. 2022)
- Day, M.D., & Bule, S. 2016. The status of weed biological control in Vanuatu. NeoBiota 30: 151-166.
- DEPC. 2014. National Invasive Species Strategy and Action Plan 2014-2020. Department of Environmental Protection and Conservation. Government of the Republic of Vanuatu. 69p.
- DEPC. 2017. Vanuatu National Environment Policy and Implementation Plan 2016-2030. Apia, Samoa. SPREP. 50p.
- DEPC. 2018. National Biodiversity Strategy and Action Plan. Department of Environmental Protection & Conservation. Government of Vanuatu.
- DEPC. 2019. Sixth National Report to CBD. Department of Environmental Protection & Conservation.
- Diamond, J.M. & Marshall, A.G. 1977. Distributional ecology of New Hebridean Birds: A species kaleidoscope. Journal of Animal Ecology 46(3): 703-727.
- Duke, N.C., Mackenzie, J., & Wood, A. 2012. 'A revision of mangrove plants of the Solomon Islands, Vanuatu, Fiji, Tonga and Samoa', Centre for Tropical Water & Aquatic Ecosystem Research (TropWATER) Publication 12/13, James Cook University, Townsville, 22 pp.
- Flecks, M., Schmitz, A., Böhme, W., Henkel, F.W., & Ineich, I. 2012. A new species of *Gehyra* Gray, 1834 (Squamata, Gekkonidae) from the Loyalty Islands and Vanuatu, and phylogenetic relationships in the genus *Gehyra* in Melanesia. Zoosystema 34(2): 203-221.
- Hartman, W.D. 1888. New species of shells from the New Hebrides and Sandwich Islands. Proceedings of the Academy of Natural Sciences of Philadelphia. 250-252, pl. 13 (available online at (<https://www.biodiversitylibrary.org/page/26286739>))
- IUCN Red List. 2022. The IUCN Red List of Threatened Species. Version 2021-2. Available at: www.iucnredlist.org. (Accessed: 30 May, 2022).

- Kalfatak, D., & Jaensch R. 2014. Directory of Wetlands of Vanuatu – 2014. Report to the Secretariat of the Pacific Regional Environment Program.
- Keith, P., Marquet, G., Lord, C., Kalfatak, D. and Vigneux, E. 2010. Vanuatu Freshwater Fish and Crustaceans. Société Française d'Ichthyologie, Paris. 200p.
- Lal, PN. & Esrom, DK. 1990. Utilisation and Management of Mangrove ('Narong') Resources in Vanuatu. Unpublished report.
- Lowry II, PP., & Munzinger, J. 2006. Exploration by the Santo 2006 Botany Team.
- Lowry II, PP., Plunkett, GM. & Frodin, DG. 2013. Revision of *Plerandra* (Araliaceae). I. A synopsis of the genus with an expanded circumscription and a new infrageneric classification. *Brittonia* 65 (1): DOI:10.1007/s12228-012-9260-2
- Mackenzie, J., Duke, NC., & Wood, A. 2013. 'MangroveWatch assessment of shoreline Mangroves in Vanuatu, Centre for Tropical Water & Aquatic Ecosystem Research (TropWATER) Publication 13/50, James Cook University, Townsville, 44 pp.
- Martínez-Garrido, J., Creed, JC., Martins, S., Almada, CH., Serrao, EA. 2017. First record of *Ruppia maritima* in West Africa supported by morphological description and phylogenetic classification. *Bot. Mar.* 60, 583.
- McKenzie, LJ., Yoshida, RL., Aini, JW., Andréfouet, S., Colin, PL., Cullen-Unsworth, LC, Hughes, AT., Payri, CE., Rota, M., Shaw, C., Skelton, PA., Tsuda, RT., Vuki, V., Unsworth, RKF. 2021. Seagrass ecosystems of the Pacific Island Countries and Territories: a global bright spot. *Marine Pollution Bulletin.* 167.
- Mourgues, A. 2005. Vanuatu Country Profile 2004. Port Vila, Vanuatu. 74p.
- Palka, L., & Pineda, R. 2006. The impact of WWII on infrastructures and landscape. In. XXX. 69-
- Keith, P., Marquet, G., Lord, C. Kalfatak, D., & Vigneux, E. 2010. Poisson et crustacés d'eau douce du Vanuatu. (Vanuatu freshwater fishes and crustaceans). 252p.
- Spalding, MD., & Leal, M. 2021. (Ed). The State of the World's Mangroves 2021. Global Mangrove Alliance. 79p.
- Steadman, DW., 2006. Extinction and biogeography of tropical Pacific birds. University of Chicago Press, Chicago, Illinois.
- Stresemann, E. 1950. Birds collected during Captain James Cook's Last Expedition. *Auk* 67(1): 66-88.
- Vilvil-Fare, S. 2006. Conservation efforts in Santo. Pp. 71-72. In. Bouchet, et al. (Eds). The Natural History of Santo. Publications scientifiques du Museum national d'Histoire naturelle.
- Worthy, TH., Hawkins, S., Bedford, S., & Spriggs, M. 2015. Avifauna from the Teouma Lapita Site, Efate Island, Vanuatu including a new genus and species of Megapode. *Pacific Science.* 69(2): 205-254. DOI: 10.2984/69.2.6

THEME 5:

BUILT ENVIRONMENT

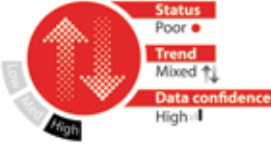


Image source: DEPC

Built Environment Overview and Highlights

The Built Environment focuses on the consequences of direct and indirect human interaction with the environment, especially in urban areas. Vanuatu has two key urban areas, Port Vila on Efate Island and Luganville on Santos Island. These urban centres attract people from the outer islands and rural areas, leading to population growth, settlement expansion and demand for goods. These are likely to have conflict with the environment, especially if issues such as waste management, energy use, sanitation and access to clean drinking water are not addressed and planned for accordingly.

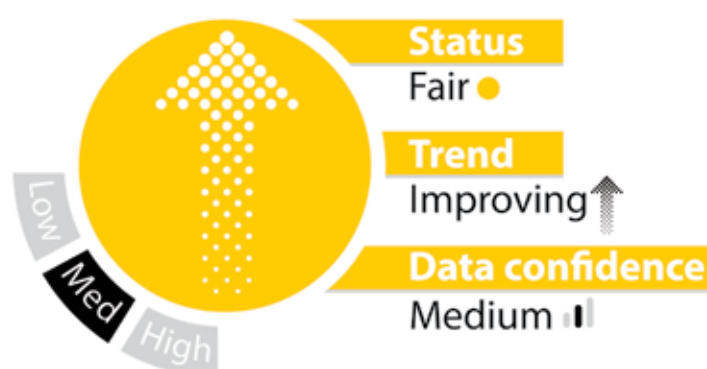
INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Renewable Energy		Vanuatu has set a national target of 100% of its energy produced from renewable sources by 2030. Currently, diesel provides most of the power for electricity. Access to electricity varies with 80% of urban households having access, whereas only 17% of rural households have access. Renewable energy represents about 17% annually to the electricity grid. Hydropower contributes the most to the grid, followed by wind power, copra oil and solar. The use of renewables as a source of energy continues to increase due to reduced prices of solar equipment and easy access to technology, but also improved quality and quantity of copra oil.	Two private utilities manage the electricity sector in urban centres. The energy sector is guided by the National Energy RoadMap (NERM), which has a strong focus on renewables and access to electricity for all citizens. A number of national policies build on the NERM in promoting renewables including the national adaptation programme of action (NAPA), the climate change and disaster risk reduction policy (CCDRR). The Ministry of Climate Change Adaptation, Meteorology and Geo-Hazards, Environment, Energy and Disaster Management has the over-arching responsibility for the energy sector. Recommendations Build local capacity in the renewable energy sector through training and other hands-on capacity building options. Source and pool resources to secure equipment for replacement and maintenance of existing infrastructure. Focus on sustainability of projects by addressing issues which may become obstacles during project implementation. Engage with development partners and encourage their support in helping Vanuatu achieve its 2030 renewable energy target.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Waste Management		Waste is a priority challenge due to increase in population. Managed or controlled waste disposal sites are found on Port Vila and Luganville, and a few others at Tafea and Malampa provinces. In Port Vila urban areas the waste generation was calculated at 465-900g per person per day. Luganville waste generation was 1.2 kg per person per day based on a 2012 study. Outside of the urban centres the waste generation is estimated to be lower (68g per person per day for Lelepa). Organic wastes and recyclable wastes are major components of waste. If these are removed and reused, it will increase the lifespan of the landfill by decades. Most of the wastes are from households compared to businesses. Hazardous waste is accepted at both Bouffa and Luganville waste sites. Some of the e-waste are collected for recycling. Asbestos wastes are buried at the landfill. Healthcare waste is incinerated and is only buried at the landfill if the incinerators are not working.	A Vanuatu National Waste Management and Pollution Control Strategy and Implementation Plan 2016-2020 has been developed. Other national plans include the National Sustainable Development Plan (NSDP 2016-2030), and the National Environmental Policy and Implementation Plan 2016-2030. A number of projects have been implemented that focus on understanding of the waste situation in the country. They include the J-PRISM II and PacWaste Plus. Recommendations - Improve governance systems at the provincial and municipal levels. - Build local capacity in waste management. - Secure financial resources either through tip fees, waste levy or projects to help expand waste management throughout the country. - National coordination is important, especially working with provincial councils and rural communities. - Strengthen national legislation including empowering provincial legislation to manage issues such as littering and illegal dumping. - Improve collection and disposal components of waste management. - Raise the awareness of the public on the impacts of waste. This should include children through the Education system. - Encourage and support recycles in the country and assist local businesses to recycle waste.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Sanitation		72% of Vanuatu's population has access to improved sanitation. Personal pit latrines, flush toilets and ventilated improved pit latrines are the most commonly accessed sanitation facility. The number of households having no access to sanitation facilities has declined to well below 1% (around 56 households in the 2020 Census). The cost of sanitation equipment is prohibitive for most families, and therefore the improvement that could be seen throughout the country on sanitation and hygiene remains stagnant.	The Government has established WASH (Water, Sanitation and Hygiene) as the over-arching response in managing these assets, especially during national emergencies. The Ministry of Health is responsible for sanitation and hygiene. Recommendations Build local technical capacity to manage and repair the sanitation infrastructure. Prioritise sanitation at the national level to encourage more investment and support in this area. Review and implement national legislation to safeguard communities and the environment from sanitation mismanagement. Public awareness is key to improving hygiene and therefore the health of all. Encourage the adoption of environmentally friendly and affordable sanitation technology and infrastructure that rural communities can use. Implement a water monitoring programme, especially at key sensitive sites and sites where communities use for recreation and for harvesting food, to ensure that these areas are safe for use.

INDICATOR	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
Potable Water		Access to improved drinking water covers 92% of the population. Urban centres have more access than rural areas. Water sources are mainly piped in Port Vila and Luganville and a few other centres, but rural areas have mostly tanks, surface and ground water. Water quality is improving with urban areas having treated water. Water is done at six locations.	There are a number of actors involved in the water sector. The Ministry of Lands and Natural Resources is one of the key stakeholders that oversees the implementation of the national water strategy. The Water Resources Management Act is the key legislation, with the Water Supply Act and the Public Health Act as supporting legislation. Recommendations Raise public awareness on the importance of safe drinking water and the need to use water efficiently including conserving water resources. Regulate human activities around catchments and place buffer zones to reduce risk of contamination and pollution. Improve water infrastructure around urban areas and continue to improve access to safe drinking water in rural areas. Build local capacity in the management of water resources.

3.5.1 Renewable Energy



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	 	Vienna Convention UNFCCC Kyoto Protocol Paris Agreement 	SAMOA Pathway 16, 18, 23, 47-50, 68	National Sustainable Development Plan; SOC 6; ENV 2; ECO 1; 2;3; 4 National Environmental Policy & Implementation Plan Intended Nationally Determined Contributions National Energy Roadmap National adaptation Programme of Action

Indicator Definition

There is a strong incentive to adopt renewable energy in Vanuatu, as a means to reduce the reliance on expensive imported fossil fuels and contribute to the management of its GHG emissions. Renewable energy infrastructure is transportable to remote areas providing a faster access to power than the traditional electric grid with posts and lines. This indicator assesses Vanuatu's uptake of renewable energy, and the country's progress towards meeting its 2030 target (100% contribution to the energy sector from renewable sources).

Status and Key Finding

Vanuatu's primary energy supply is dominated by biomass (mainly for rural cooking) and petroleum (urban energy and transport). The Department of Energy estimates that 80% of urban and 17% of rural households have access to electricity (IRENA 2015), although nationally only 30% of households have access (Khelawan 2018). Data provided by the Utilities Regulatory Authority indicate that diesel power still provides on average 57 GWh from 2014 to 2020, whereas renewable sources provide 17 GWh on average over the same period (Figure 83) (Utilities Regulatory Authority 2020a).

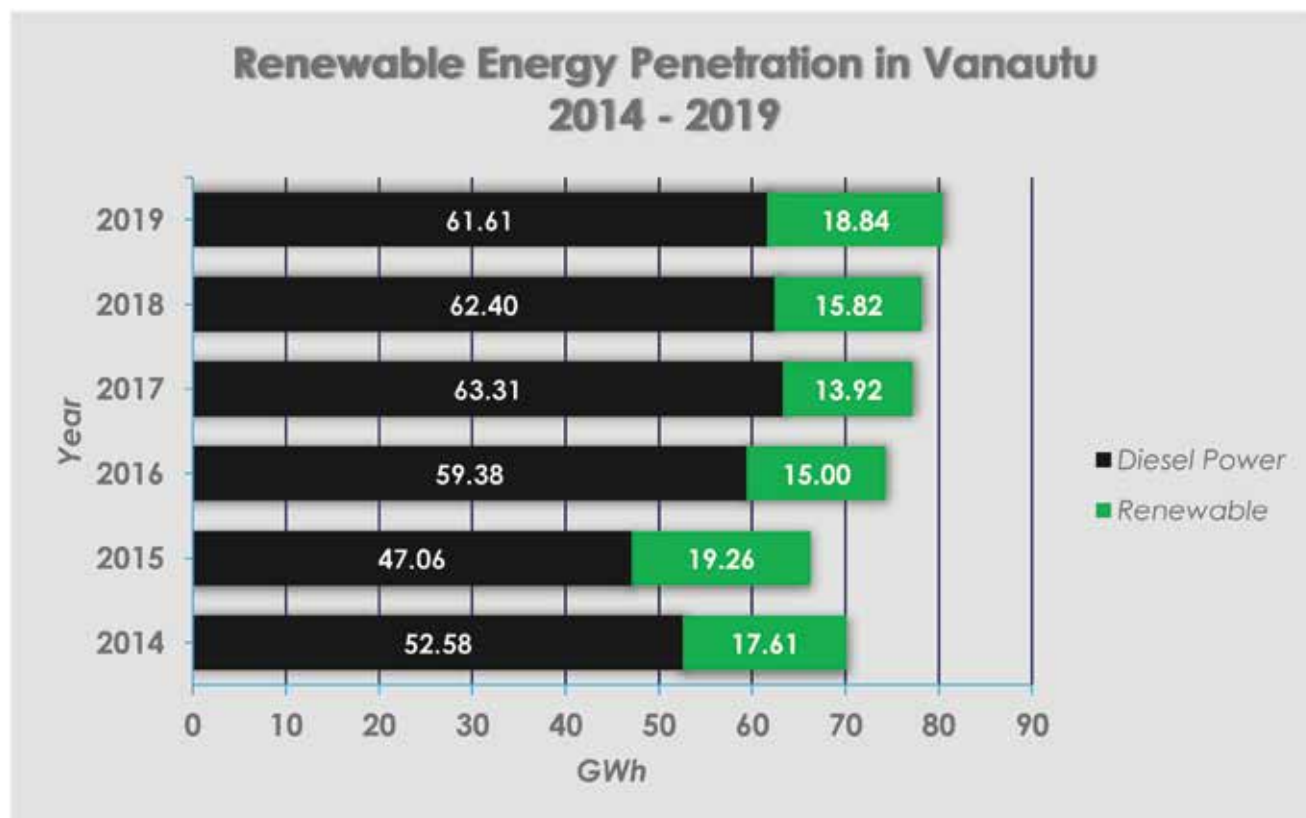


Figure 83: Diesel and renewables contributions to the grid from 2014 to 2020. (Utilities Regulatory Authority 2020a)

Vanuatu's renewable energy sources are copra oil, hydro, wind and solar (Utilities Regulatory Authority, 2020a, 2020b). Hydropower contributes the most to the grid, with an average of 7.19 GWh per annum, followed by wind power (5.91 GWh), copra oil (2.11 GWh) and solar (2.05 GWh).

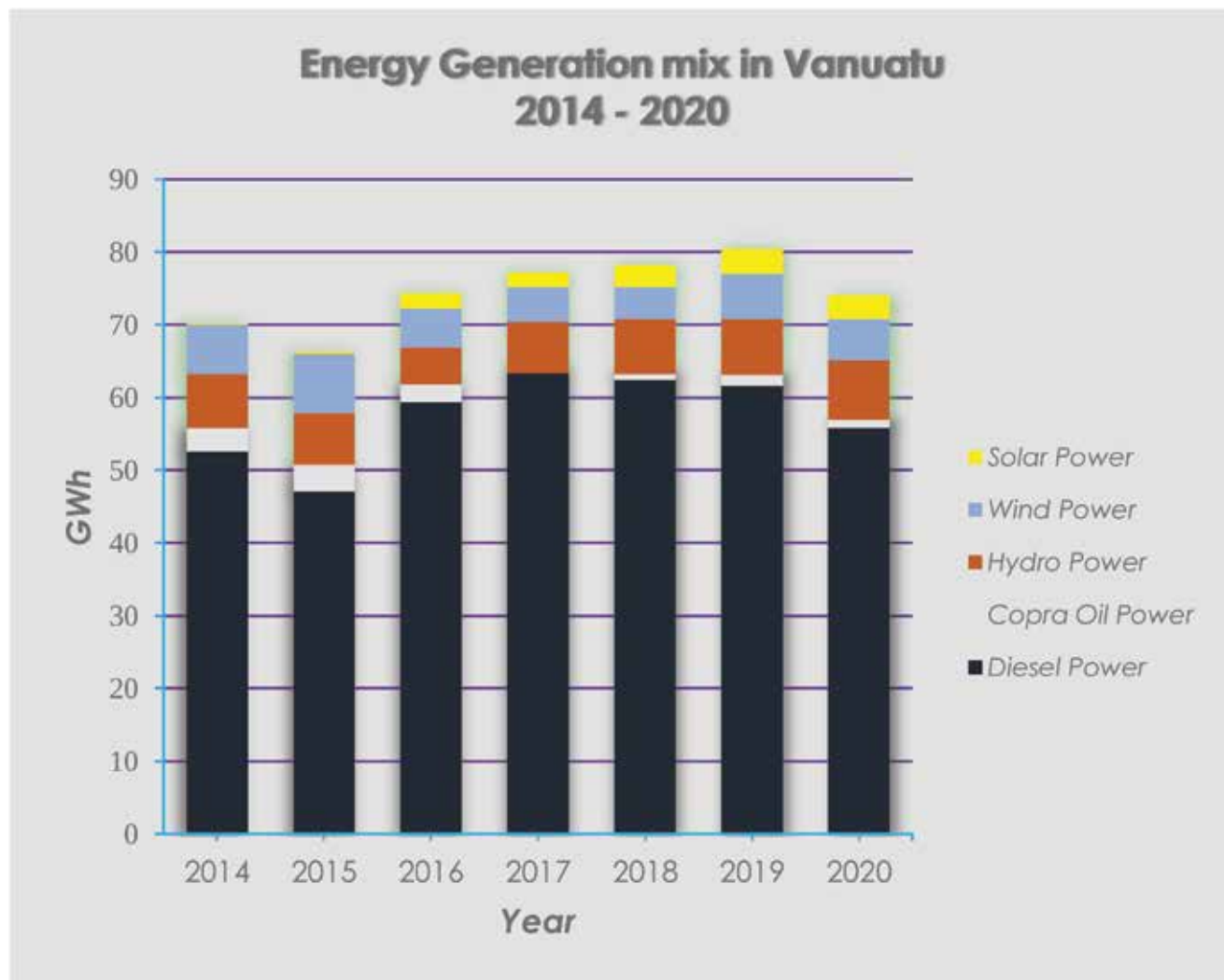


Figure 84: Vanuatu's energy sources from 2014 to 2020. (Utilities Regulatory Authority 2020a).

The capacity of these renewable energy sources varies considerably from month to month and from year to year (NERM 2016). Despite the variations in energy outputs, renewables continue to contribute to the grid because of the increased installation of solar infrastructure and copra oil (NERM 2016). There is still some way to go before the country is able to meet its national target (Table 35; Figure 85).

Table 35: Current and expected progress on renewable energy sources. (NERM 2016)

CURRENT AND EXPECTED PROGRESS ON RENEWABLE ENERGY SOURCES			
Target: Generating electricity from renewable energy sources	2015	2020	2030
NERM 2012 Baseline 19%			
Target	40%	65%	100
Actual	29%	40%	-

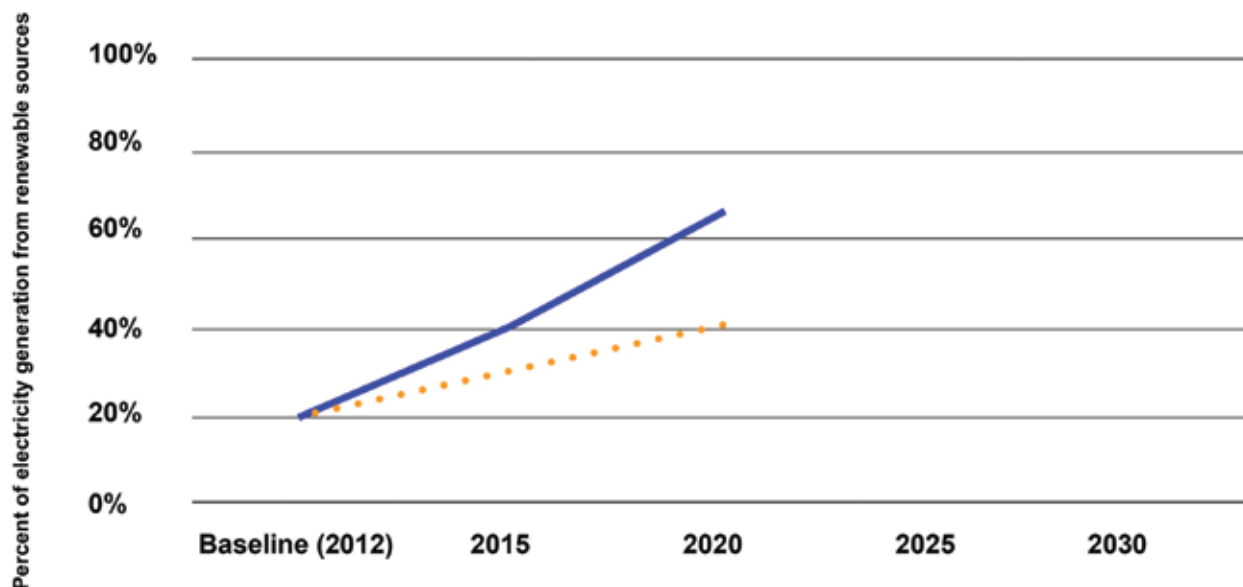


Figure 85: Per cent of electricity generation from renewable sources. (NERM 2016)

The monthly increases in renewable energy generation for 2020 compared to 2019 is indicative of the growth within the renewable sector (Figure 86).

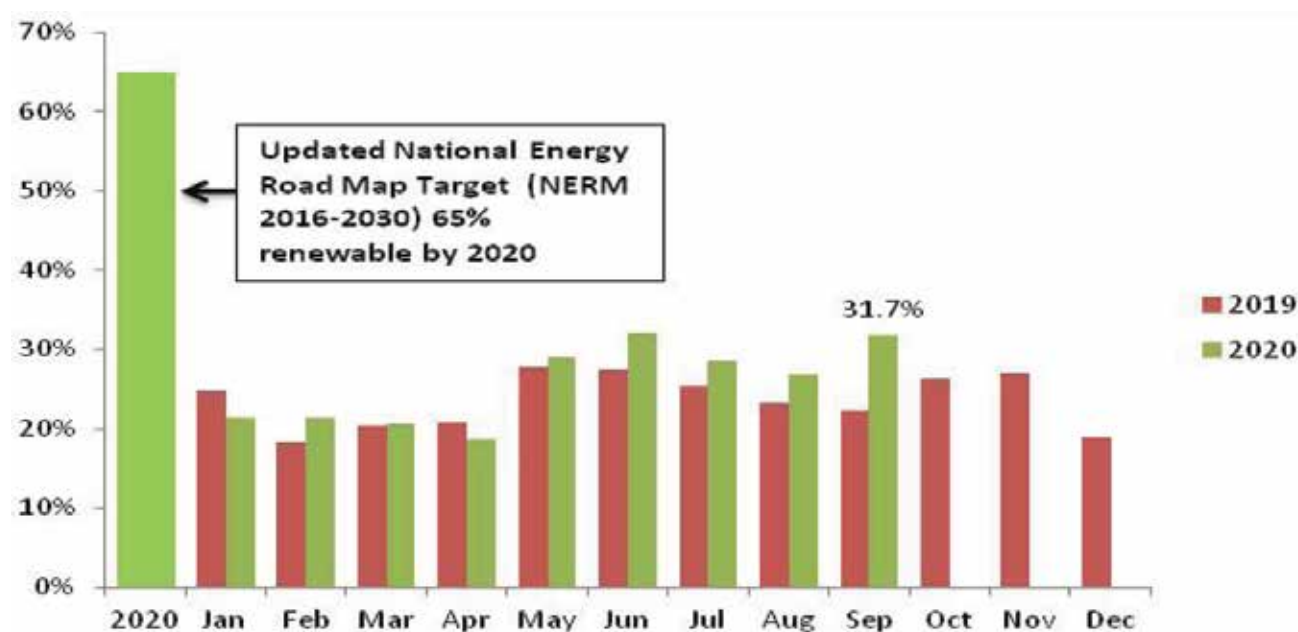


Figure 86: Renewable energy generation by month for 2019 and 2020. (Utilities Regulatory Authority 2020b)

The number of households that use solar for the main source of lighting is high in rural areas, with the provinces of Torba, Penama and Malampa having over 90% of households using solar (Figure 87).

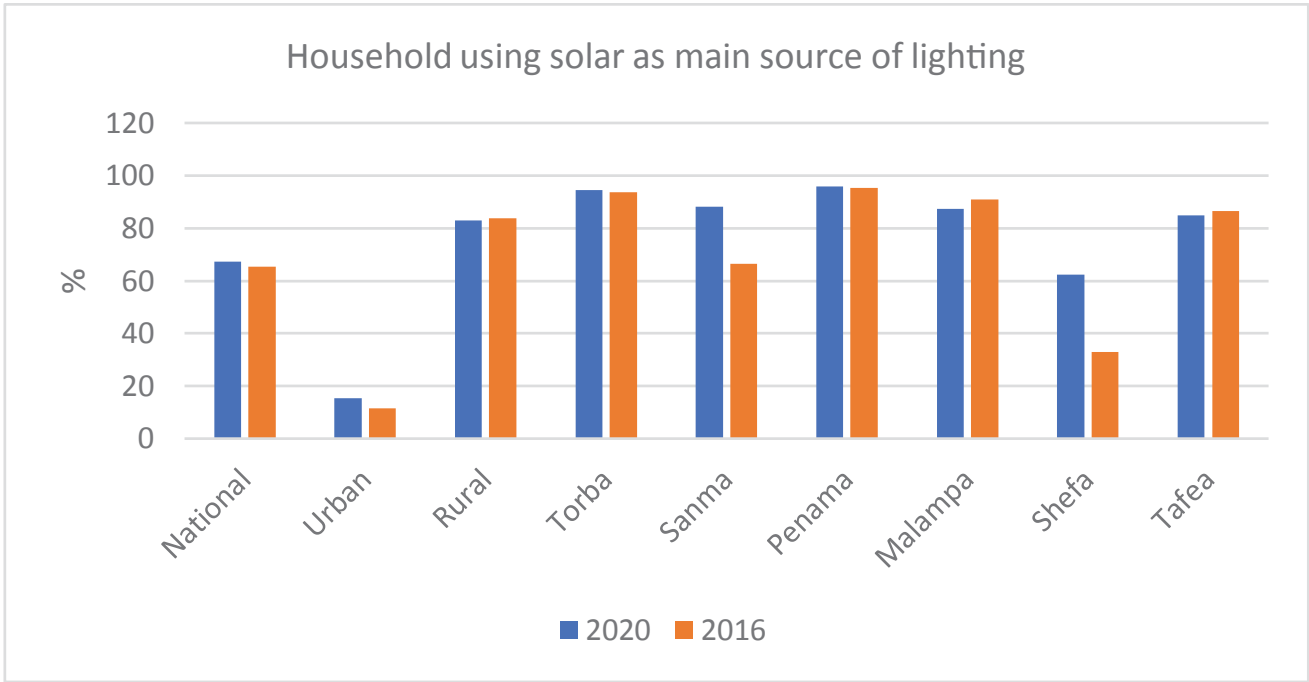


Figure 87: Households using solar as a main source of lighting for 2016 and 2020 years. (VNSO 2016, 2020)

Solar Photovoltaic

The potential for solar (Figure 88) throughout Vanuatu is excellent and it is ideal for generating electricity to offset imported fuels.



Figure 88: Solar Photovoltaic is part of Vanuatu’s renewable energy sources. (DEPC)

In the INDC (2015) solar contributed 0.2% to the grid, since then it has increased to 3.3% (Utilities Regulatory Authority 2020a). The adoption of solar have seen the reduction of kerosene use by 25% in 2014 from the 2010 consumption level (Department of Customs and Inland Revenue 2015). There is a target to increase solar installations to provide 13% of renewables to meet the 2030 Target (Figure 89). Part of the intervention is to encourage individual solar home systems (INDC 2015). However, it is noted in the NERM that there are concerns on the sustainability of solar due to equipment, performance, adequacy in relations to the energy needs at each location, post-installation services and maintenance problems (INDC 2015). Sourcing of equipment parts is a challenge, especially as most of the existing solar systems were installed under different donor projects, with equipment sourced from various countries. Instability to the grid caused by Solar PV is another issue identified by the IRENA Renewables Readiness Assessment that needs to be resolved. Despite these issues, solar is becoming affordable, due to cheap solar panels, inverters and battery capacity, as well as user-friendly access to technology. Vanuatu is relying on a global solution to help resolve the issue with grid instability (INDC 2015).

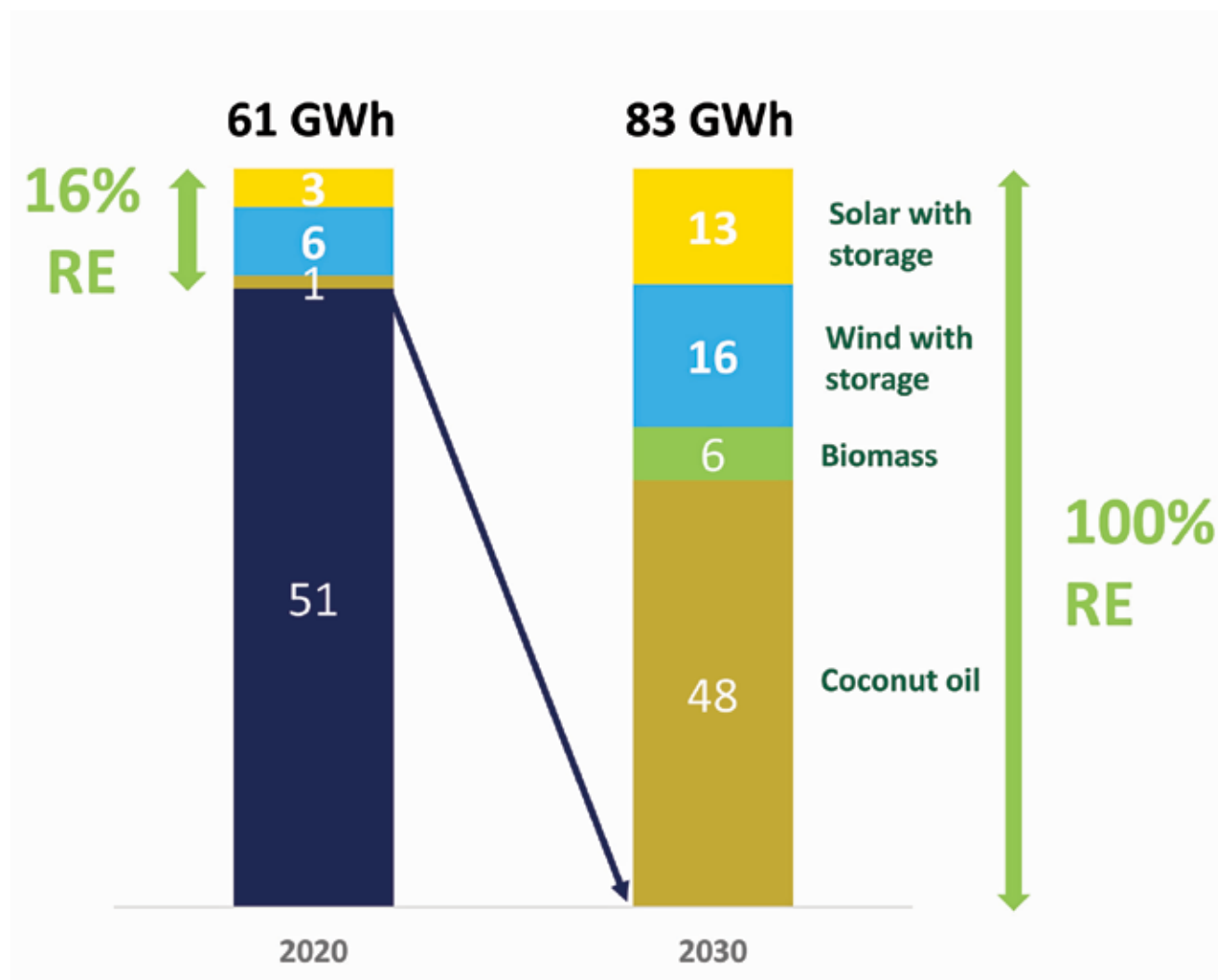


Figure 89: Vanuatu's renewable energy mix in 2020 and projection for 2030. (UNELCO 2021)



Wind

UNELCO installed eleven 275 kW wind turbines at Devil's Point near Port Vila, with a total capacity of 3.5 MW. The wind turbines contributed 13.3% in 2020 to the electricity (UTA 2020b). The economic benefits are attracting interest to install more wind turbines, including sites in Futuna and Aneityum. Batteries are also being considered to allow power generated to be stored. Wind survey masts are being installed in Tanna, Tongoa, Malekula, Santo, Pentecost and Vanua Lava to collect wind data. UNELCO has set a target of 19% of wind generated energy in order to meet the 100% renewable national target.



Hydropower

Due to the limited watershed areas in the country, few permanent streams are large enough to generate power. A number of hydropower sites are established or are in the process of being established including the Talise Hydro (Maewo), Loltong Hydro (North Pentecost), Brenwe Hydro (Malekula), Wampo River (Santo), and the Sarakata Hydro (Santo). The Sarakata Hydro with a 1.2 MW capacity generates 88% of Luganville's monthly demand when conditions are favourable (BAU 2016). Overall, it contributed 13.1% power in to the energy mix for the month of September 2020 (URA 2020b). The Talise Hydro is a 75 kW micro-hydropower that is currently being constructed.



Biomass

Around 43,600 tons of fuel wood is burned each year for cooking and crop drying. Almost all the fuel wood is used in rural areas, as people in towns cook mostly with liquefied petroleum gas (LPG) or kerosene. However, some wood and charcoal are available at urban markets for cooking. There is no evidence that this level of wood use is detrimental to Vanuatu's forests. Deforestation in Vanuatu appears to be tied mainly to agricultural expansion and logging. Although saw log yields in Vanuatu are currently around 10,000 cubic metres (m³), the sustainable harvest level has been estimated at 38,000-60,000 m³ logs per year. It is possible, therefore, that substantial forest production waste could be used as feedstock in future as forest plantations expand and mature. This could be used for electricity generation both for powering the forest products facility and providing electricity to nearby villages. UNELCO has identified a 7% contribution from biomass towards its renewable target by 2030.



Biogas

A pre-feasibility study funded by ADB of a new Port Vila municipality managing an anaerobic sludge-sewage treatment facility was completed in 2012. Biogas generated by the facility would be captured and used for electricity generation. Estimates show 275 MWh of electricity per year can be generated by the proposed facility. This could be enough to provide the energy needed by the treatment facility itself.



Biofuel (copra oil)

Copra oil was used directly or as a premix with diesel or kerosene for generally engine use. The global price for copra oil rose above diesel making it unviable, and therefore its use declined rapidly. Copra oil is now used mostly by UNELCO as a premix with diesel to generate power. Copra is provided locally, and UNELCO processes the oil to ensure the quality is suitable for its engines. The consumption level is linked to copra oil supply, which depends on market competition and to some extent on weather conditions. The amount of copra oil used in 2010 was less than 1% increasing substantially a decade later (estimated at 8 MW in 2018). A number of biofuel projects were implemented or were planned to include Port Olry, Mosine, Sola, Lolowai, Longana, Saratamata, Lavalsal Fotinweiau, Vao, Orap and Wala but no information was available on their status.



Geothermal

Geothermal energy works reliably and continuously, requires limited land area for installation, often generates electricity more cost-effectively than diesel plants, and provides base load generation. Surveys in the 1990s found two active geothermal areas on Efate (Takara and Teuma Graben) with useable temperatures of $> 50^{\circ}\text{C}$ (Figure 90). Work in this area is continuing but it is anticipated that once operational it should provide 8 MW capacity (IRENA 2015).



Impacts

The lack of access to energy, specifically to electricity can have negative consequences for communities especially in the areas of health and food security. Medicines and food that need to be kept safe and in cool temperatures will have a short life-span. In some areas, especially in urban centres, the convenience in accessing energy has contributed to a sedentary lifestyle leading to a disconnection with culture and the environment. This is another adverse impact to easy access to energy, leading to increased consumption of goods contributing to the waste challenge.

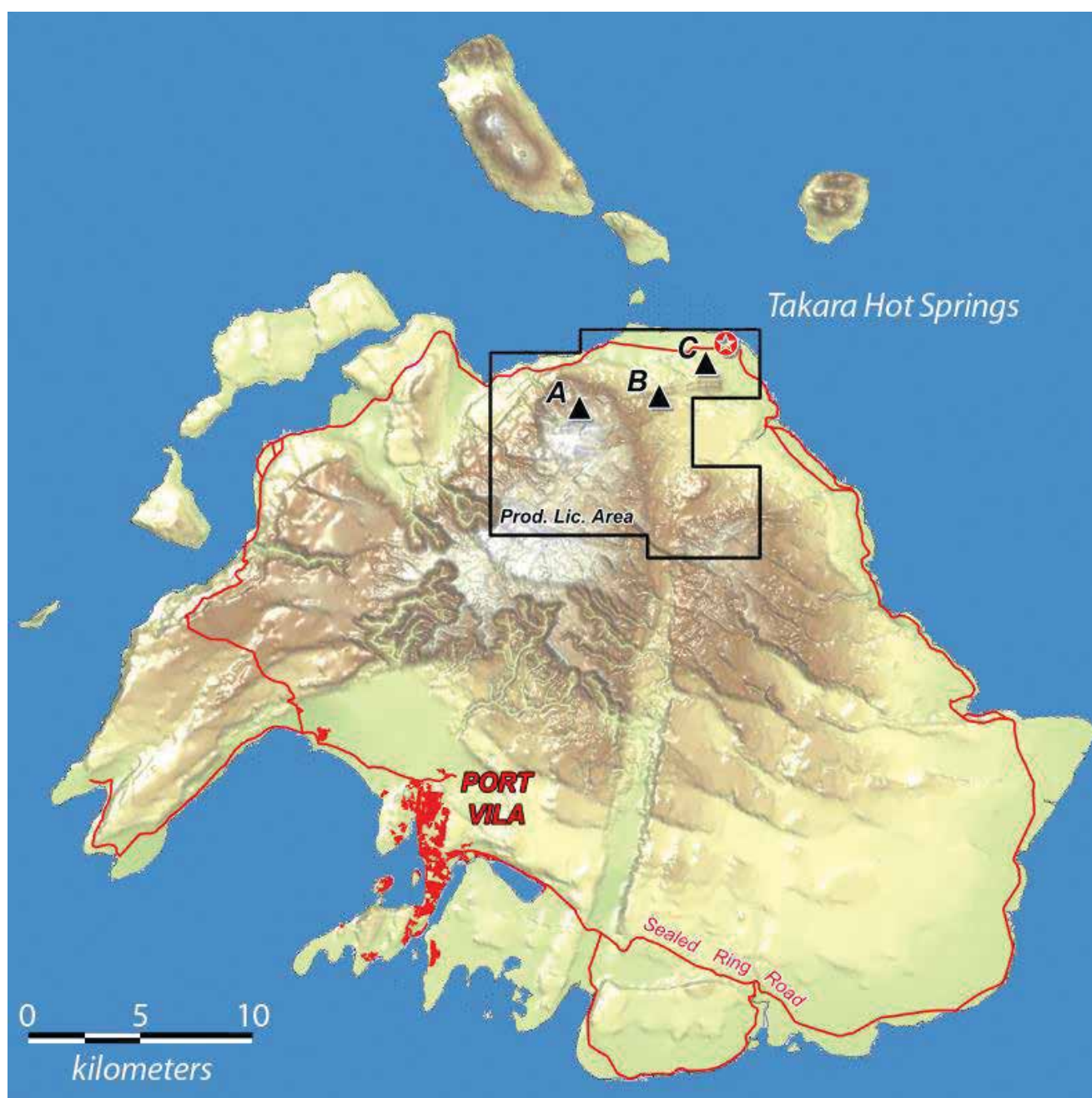


Figure 90: Geothermal active areas. (IRENA 2015)

Response

Two private utilities, Union Electrique du Vanuatu (UNELCO) and Vanuatu Utilities and Infrastructure (VUI), serve four concession areas (Port Vila, Tanna, Malekula and Luganville) through grids, and are regulated by an independent government agency, the Utilities Regulatory Authority (URA). Vanuatu has an energy policy, the National Energy Road Map (NERM), which has a strong focus on the uptake of renewable energy and access to electricity by all citizens. NERM has an ambitious 65% renewable target by 2020, which was revised to 100% by 2030 in 2016. Renewable energy is the country's key mitigation strategy captured under NERM, which was endorsed by the Committee of Ministers (COM) for the period to 2030. The NERM consolidated fragmented approaches and ad hoc energy policies that were driven often by development partners.

The National Adaptation Programme of Action (NAPA) provides a closer look at the sectors that will be affected by climate change and putting in place measures to reduce their risk.

The Climate Change and Disaster Risk Reduction Policy focuses on governance, finance, knowledge, information, and themes related to climate change adaptation, low carbon development and response, and recovery.

Vanuatu has also put in place institutional arrangements including establishing the Ministry for Climate Change, which houses the meteorological and geo-hazards department, the disaster management office, the energy department and the department of environment. The energy component is the key responsibility of the Department of Energy, which includes the electricity grids, the petroleum sector and energy efficiency use.

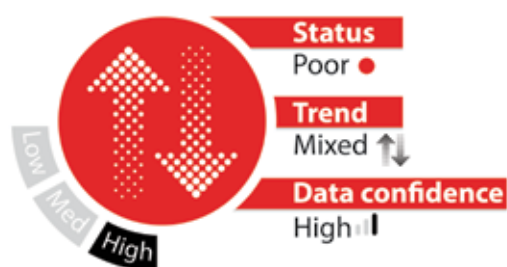
The Government has established the National Advisory Board on climate Change and Disaster Risk Reduction, with membership from both the government and non-governmental organisations. This Board is a national advisory body overseeing risk reduction, climate change programmes, projects, initiatives and activities. A Project Management Unit has the responsibility of aligning climate change initiatives with development strategies.

Vanuatu has also established a National Green Energy Fund to assist with implementing the NERM. The fund aims to consolidate existing financial resources, source new domestic and international funding and fund renewable energy based electricity access and other green energy investments in the country (NERM 2016).

Recommendations

- Capacity is a challenge for the country, given that all of the renewable projects require some level of technical competency. It is important that Vanuatu trains and builds the capacity of its people to install and maintain renewable infrastructure.
- The remoteness of Vanuatu like many Pacific island countries from key markets puts them at a disadvantage when it comes to sourcing resources, including equipment and spare parts for renewable infrastructure. The Pacific region could look at pooling their resources to ensure that these parts are stocked and readily accessible by island countries.
- The sustainability of many renewable projects has been a challenge. There needs to be more emphasis on the sustainability of all future projects so that communities and the country are able to maintain them into the future.
- Review existing legislation and policies on renewable energy to ensure that appropriate standards are being legislated for and proper incentives provided to encourage the uptake of renewables by households, communities and the private sector.
- Engage with regional and international partners for assistance in transitioning renewable energy into the national grid, to ensure there is stability in the system with minimal disruption to households and the business community.

3.5.2 Waste Management



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 58 (d), 70, 71 (a, d).	National Sustainable Development Plan ENV 2; 3; 4; 5; ECO 2; 3; SOC 3; 6
				Waigani Convention Asbestos Convention Asbestos Free Pacific SPREP Dumping Protocol	National Environmental Policy and Implementation Plan National Waste Management and Pollution Control Strategy and Implementation Plan 2016-2020

Solid Waste

Indicator Definition

The amount of solid waste generated calculated based on the volume being managed at the dump. Trend in average daily per capita generation of solid waste. The type of waste being generated.

Status and Key Findings

Waste generation per capita

Waste is a key and a growing concern for the country. Most of the waste surveys and audits have been conducted in urban areas including Port Vila and Luganville.

In Port Vila it was estimated that the solid waste generation in the early 1990s was 0.65 kg/capita/day (McIntyre 2005). By early 2000, the World Bank estimated the waste generation at 3.28 kg/capita/day or 110 tonnes/day (Hoorweg and Bhada-Tata 2012). The World Bank projected the solid waste generation to reach 3 kg/capita/day or 339 tonnes/day by 2025 (Hoorweg and Bhada-Tata 2012). By the early 2010s, the waste generation for Port Vila was 1-1.5 kg/capita/day or 70-75 tons/day, projected to reach 145 tons/day over the next 20 years (ADB 2014). By 2017 the waste generation per capita for Port Vila was 0.91 kg/capita/day (PVM 2017).

In Luganville a waste characterisation was carried out in 2012 finding waste generation at 1.2 kg/capita/day. The average household produces 46 kg of waste per week. Households with high income generated the least amount of waste, whereas those in medium-income households generated the most waste. Low socio-economic households produced twice as much waste as high-income households (O'Reilly 2012).

Waste generation outside of the urban areas has not been thoroughly assessed, although some islands including Lelepa, Ifira, Tutuba and Mavea were included in a waste audit in 2018 (Wander et al. 2019). In the mentioned study, waste disposal rate was calculated at 68 g/capita/day for Lelepa Island, compared to 465 g /capita/day in Port Vila (Table 36).

Table 36: Average waste disposal rate of selected sites from Vanuatu. (Wander et al. 2019)

AREA	AVERAGE WASTE DISPOSAL (G/CAPITA/DAY)	95% CI (G/ CAPITA/DAY)	PICKUP FREQUENCY	AVERAGE NUMBER OF HOUSEHOLDERS*
Port Vila (urban Efate)	465	382–548	2/week	5.8
Shefa (rural Efate)	205	145–265	1/week	6.4
Luganville (rural)	151	121–181	1/week	5.1
Lelepa (remote)	68	50–76	2/week	4.9

*The number of householders is based on data collected from household interviews and not on the Bureau of Statistics data.

Waste composition

Organic waste is a major component of household wastes (Figure 91). In terms of single items, nappies were the most abundant, followed by steel cans and PET bottles (Wander et al. 2019).

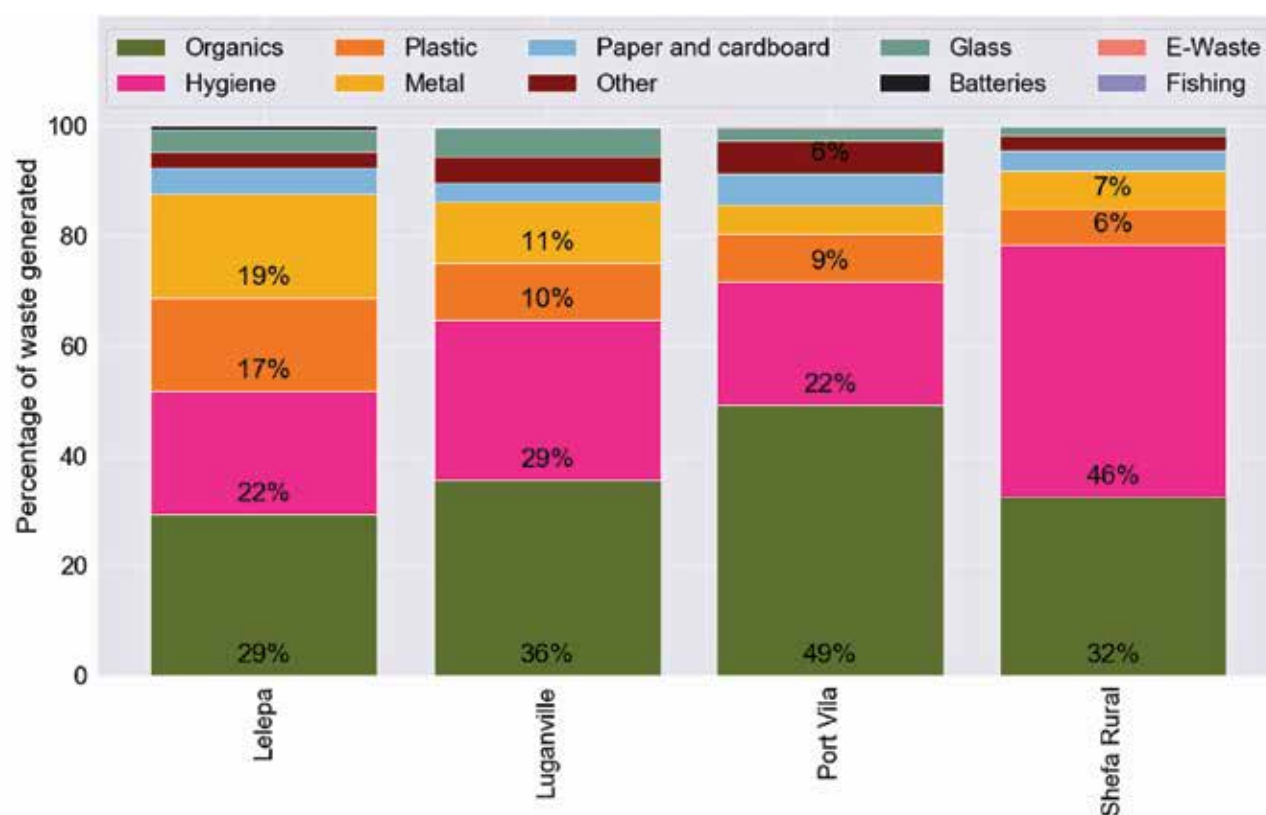


Figure 91: Waste composition between selected sites.
(APWC Vanuatu Waste data Report – Wander et al. 2019)

Waste generation by source

Households generate most of the waste being dumped at landfills in Port Vila and in rural areas, whereas commercial premises generate more at Luganville (Table 37).

Table 37: Waste generation by source 2020. (PacWastePlus-SPREP 2020)

WASTE SOURCE	WASTE DISPOSED AT BOUFFA LANDFILL, 2020 (T)	WASTE DISPOSED AT LUGANVILLE DUMPSITE, 2020 (T)	WASTE DISPOSED OF, ISLANDS APART FROM EFATE AND ESPIRITU SANTO, 2020 (T, ESTIMATE)
Household Municipal Solid Waste	3063	1831	2381
Household Self Haul	4827	702	913
Construction and Demolition	0.0	0.0	0.0
Private Waste Contractor	697	974	1267
Office	315	192	249
Commercial and Industrial	2145	1364	1774
Hospitals and Veterinary Clinics	562	0.0	0.0
Resorts, Hotels and Apartments	1273	934	1214
Charity/Church	265	0	0
Other*	843	0	0
Total	13101	5997	7797

*Other items include end of life vehicles and end of life renewable energy equipment

Waste disposal

Solid wastes in urban areas are disposed of at Bouffa Landfill (Port Vila City Council), Luganville dumpsite (Luganville Municipal Council) and Lenakel dumpsite (Lenakel Municipal Council). Some councils such as Lenakel Municipal Council and Malampa Province have commenced some small and collection and disposal services.

In other provinces and remote communities waste is disposed in openly assigned areas, or in backyards (DEPC 2016). Backyard waste is buried, burnt or dumped.

Bouffa Landfill

Bouffa Landfill (Figure 92) began operating in 1995 to service Port Vila residents and businesses. Originally as an open dumpsite before it was upgraded into a semi-aerobic landfill in 2006. About 60% of the wastes generated in Port Vila Municipal are collected by municipality's trucks (ADB 2014). Although the total area for the site is 48 ha, only 5 ha is being used. Collection is mainly within the Port Vila Urban Area, with little to no waste collection at the edges of Port Vila. In those areas, home to around 40,000 people, waste is dumped or burned near where it is generated (ADB 2014). The 2020 waste audit report calculated 13,101 tonnes of waste disposed at Bouffa Landfill, of households are the main waste source followed by the private sector (Figure 93). Organic and recyclable materials are the most common types of waste followed by plastic and metals (Figure 94).



Figure 92: Bouffa Landfill (PacWastePlus-SPREP)

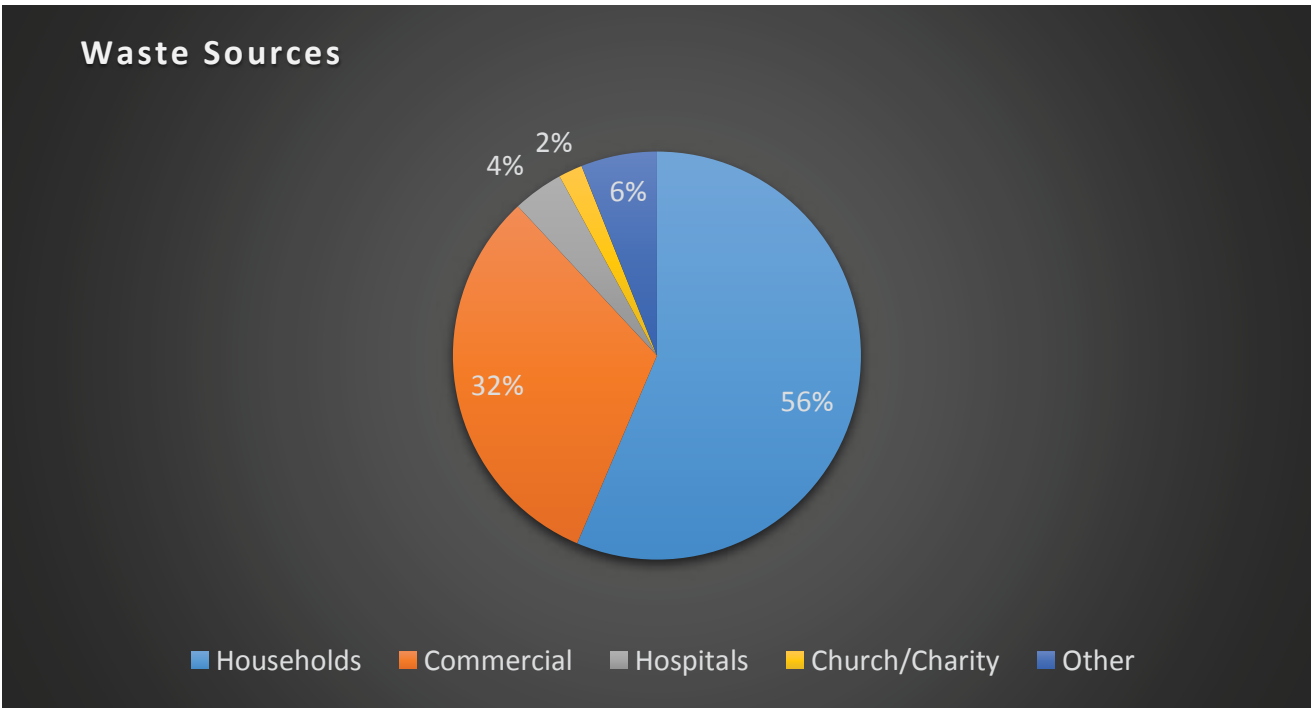


Figure 93: Waste generation sources in 2020 at Bouffa Landfill. (PacWastePlus-SPREP 2020)

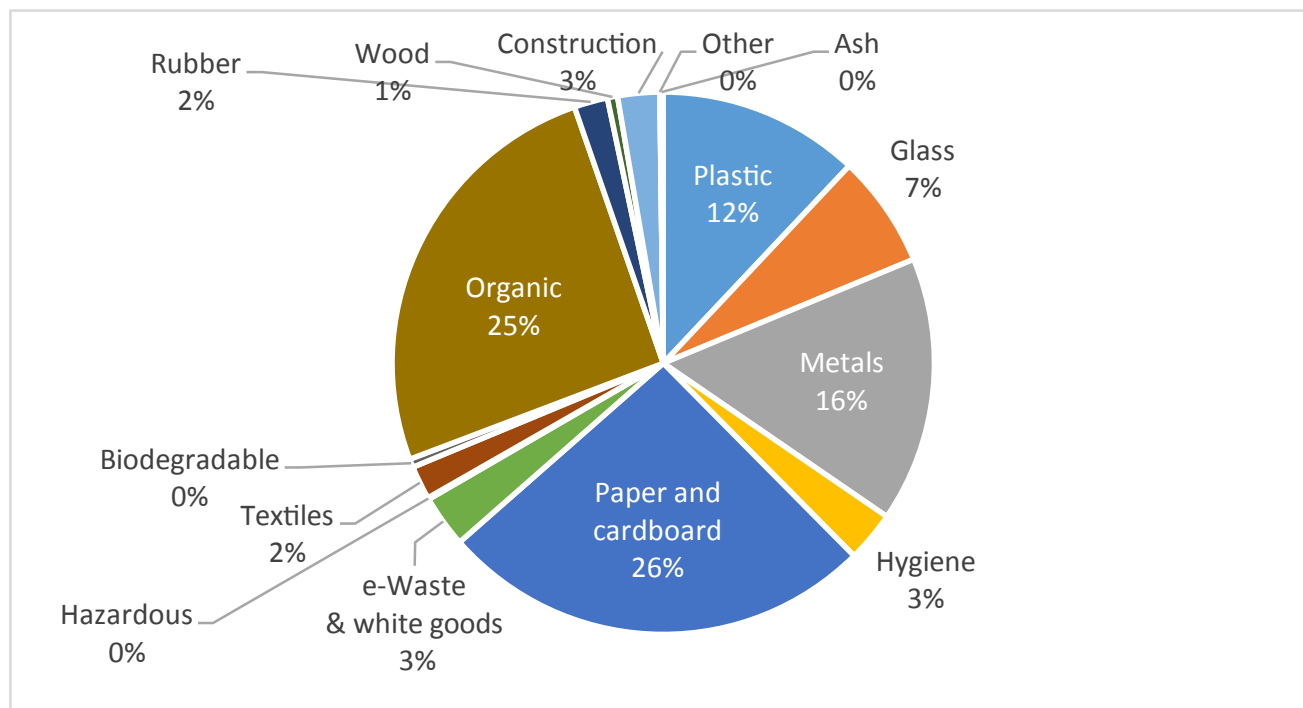


Figure 94: Estimated volume of solid waste disposed at Bouffa Landfill in 2020. (PacWastePlus-SPREP 2020)

Luganville Waste Disposal Site



Figure 95: Luganville Waste Disposal Site (PacWastePlus-SPREP 2023)

Luanville dumpsite (Figure 95) is located about 6 km from the town centre and has been operational since the end of WW2, when the site was initially opened as a limestone quarry. In 2017, the dumpsite was extended, and the site is now approximately 4.2 hectares with the capacity to last an additional 20 years (Wander 2019). Luganville dumpsite is a controlled disposal site (DEPC 2016). There are nine landowners of the site and approval for expansion requires all the landowners' consent. The Luganville Municipal Council (LMC) has been struggling to provide ongoing maintenance of the site by hiring heavy equipment every 3 to 4 months. The recent donation by JICA in December 2020 of a new bulldozer with a rubbish truck is now allowing LMC to provide regular maintenance. There are more improvements needed to the site to function properly such as a weighing bridge with a gated office, some supporting workers on site and the implementation of regular soil cover. The 2020 waste audit found that commercial premises generated the higher waste volume compared to households (Figure 96). Organic waste was by far the most common waste type making up near 60% of the waste being disposed.

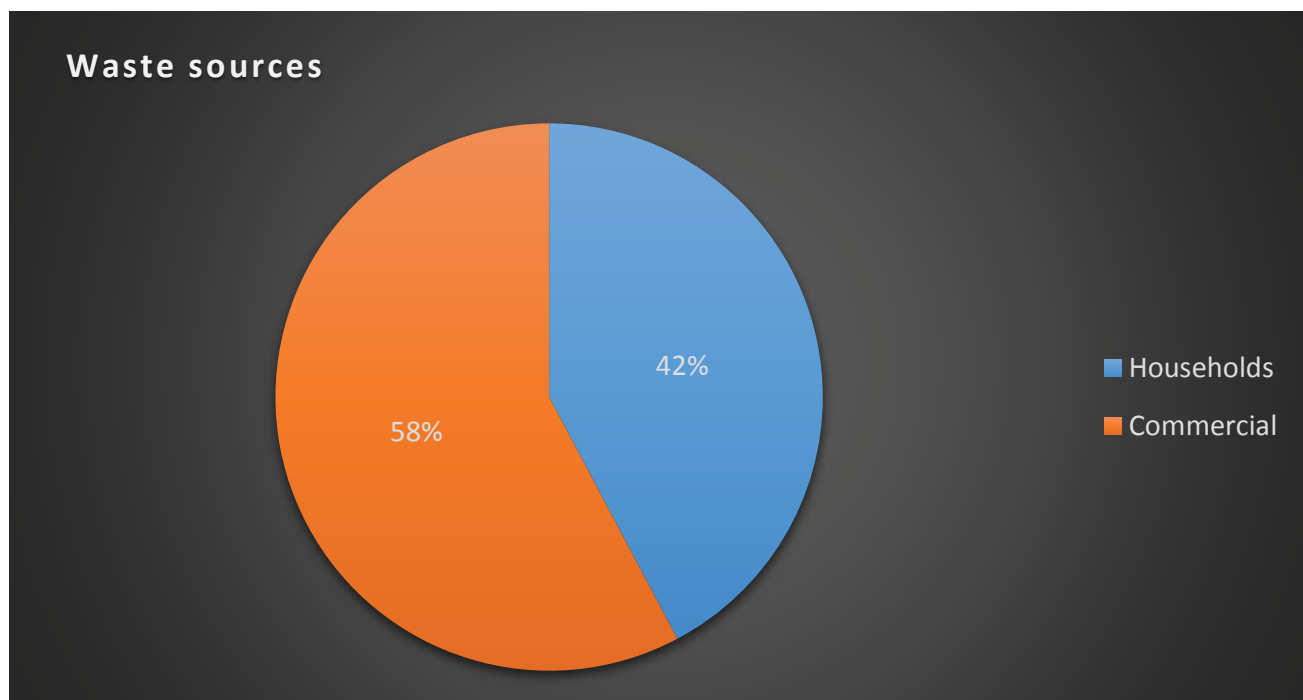


Figure 96: Waste generation sources in 2020 at Luganville dumpsite (PacWastePlus-SPREP 2020)

Lenakel dumpsite, Tafea Province

This site is included here because it is the de facto location for the disposal of waste in Tafea Province. It is currently used for waste disposal, but not yet legally endorsed by the Department of Environment Protection and Conservation. There are no facilities available on site and lots of improvements are needed in the future to upgrade the area.

Lakatoro dumpsite, Malampa Province

The site is included here because it is the location for the disposal of waste in Malampa Province. It is also under customary ownership and yet to be legally endorsed for waste disposal purposes. There are no facilities on-site and it requires lots of improvement in the future to upgrade the area. Some fencing and a temporary gate have been installed to demarcate the area.

Recyclables

Recycling in Vanuatu is currently undertaken by a private company, RecycleCorp, which collects aluminium cans, glass, scrap metal and batteries and even some e-waste for recycling. They have a yard at Port Vila and another at Luganville where they stockpile used car batteries, end-of-life vehicles (ELV), roofing materials and scrap metals, aluminium and copper from electronic wastes (Figure 97). RecycleCorp collects directly from pickers at the landfill and provides 240-litre mobile garbage bins (MGBs) to commercial premises (for a fee) in Port Vila. Recyclable wastes are shipped to overseas countries for further processing.



Figure 97: RecycleCorp recycles a range of waste including aluminium and copper from e-waste. (RecycleCorp ©)

Most of the waste that could potentially be recycled or recovered is being dumped (PacWastePlus-SPREP 2020). If these materials are recovered, it will help extend the use of the landfill for many years to come. It is estimated that over 75% will be saved from being dumped if proper recycling and recoverable systems are put in place (PacWastePlus 2020).

Hazardous Waste

Hazardous wastes include substances that are toxic to human health, or the environment and must be disposed of appropriately. While there are many types of hazardous wastes, the three important ones are asbestos, e-waste and healthcare wastes. The recent waste audit found that hazardous wastes are accepted at the Bouffa and Luganville landfills. About 0.1% of hazardous wastes are found at the Bouffa landfill.

Asbestos Waste

There are various forms of asbestos and asbestos containing material. Asbestos is a group of naturally occurring minerals that occur as fibrous silicates. The most common types of asbestos fibres are Chrysotile (white), Crocidolite (blue) and Amosite (brown). The colour differences are very slight and laboratory analysis is needed to confirm the identity of different types of asbestos fibre. Asbestos Containing Material (ACM) means any material or thing that, as part of its design, contains asbestos. All forms of asbestos are proven causes of cancer in humans. Potential health

problems occur if/when asbestos fibres become airborne. People can be exposed to asbestos by breathing in air that contains / is contaminated with asbestos fibres. Asbestos exposure does not necessarily lead to the development of an asbestos-related disease. Asbestos-related diseases take time to develop, with asbestosis reportedly presenting 20 to 30 years from the time someone is initially exposed to asbestos. Asbestos wastes are accepted at Bouffa and Luganville landfills, where they are buried.



Figure 98: Asbestos that is left exposed can cause serious harm and even death. (PacWastePlus-SPREP 2022).

E-Waste

E-Waste includes computer, television sets, mobile phones and other electrical items (Table 38). There are no data on the quantity of e-waste being disposed, but RecycleCorp collects some for recycling (Wander et al. 2019). The 2020 waste audit found that 4% of waste disposed was e-waste and white goods at the Luganville landfill, and 3.1% at the Bouffa landfill.

From 2014-2017, the Government in partnership with SPREP implemented the PacWaste project, improving the safe dismantling and export of e-waste and creating a public awareness campaign (SPREP 2017). This work continues under the EU-PacWastePlus project currently being implemented in Vanuatu and other Pacific Island Countries (Wander et al. 2019).

Table 38: E-Waste types

	CATEGORY	DESCRIPTION
E-WASTE	Computer	Keyboard, monitor, hard drives, printers, etc.
	TVs	TVs
	Mobile phones	Mobile phones, phones, pads, charges, car kits, Bluetooth
	Electrical items and peripherals	Radio, iPod, Gameboys, stereos, speakers, VCR, DVD players, power tools, wiring and cables, small electrical items (toaster, blender, etc.), computer discs, cassettes, DVDs, CDs
	Toner cartridges	Printer and toner cartridges

Healthcare Waste

Incinerators are used to manage health waste in Port Vila and Luganville. However, frequent breakdowns in the incinerators have resulted in healthcare waste being deposited at landfills. The recent waste audit in 2020 reported the Luganville incinerator facility was non-operational with healthcare waste being buried at the landfill (PacWastePlus-SPREP 2020).

For healthcare waste, the Incinerator Facility in Luganville is not working. An excavated hole is prepared for the disposal of incoming healthcare waste at the waste disposal site. In addition, an area is designated at the Luganville waste disposal site for the safe burial of incoming asbestos (PacWastePlus-SPREP 2020).

Impact

The growing population and the influence of outside trends on many households will inevitably lead to the demand for imported goods thereby increasing the waste challenge. Many of the by-products of these goods are not being disposed of correctly and this can lead to contamination and pollution of the environment. Some of the goods have toxic components to human health and the environment, and they can be hazardous if the toxins contaminate food and water that communities consume.

Response

Vanuatu is one of the leading countries to ban single use plastic bags, plastic straws and polystyrene takeaway containers in 2018. This was supported through the enactment of the Waste Management Regulations Order No. 15 of 2018 and the Waste Management (Penalty Notice) Regulation Order No. 17 of 2018. In 2019, Vanuatu banned the use of nylon mesh and Styrofoam trays, single-use disposable plastic cutlery, single-use disposable plastic plates, disposable plastic stirrers for coffee and tea, single-use plastic cups (polyethylene) and single use plastic (polystyrene) cups, plastic (polyethylene) egg cartons and plastic flowers.

Studies and assessments on the waste problem have been the focus for the country over the past couple of decades. By understanding the current scenario, the Government, Provinces, municipal councils and communities can put in place measures to manage the waste problem. The National Sustainability Development Plan sets the agenda on waste, through the Blue-Green Economic Growth (ENV 2.4). Waste is also a key strategic issue under the National Environmental Policy and Implementation Plan 2016-2030, which builds on the Vanuatu Waste Management Policy 2001, and subsequent updated versions: Vanuatu National Waste Management Strategy and Action Plans 2011-2016, and the National Waste Management, Pollution Control Strategy and Action Plan (2016-2020).

A stocktake of waste legislation has been completed (Peel et al. 2020) where two pieces of legislation have been enacted to manage waste – the Waste Management Act 2014 and the Pollution Control Act 2013. Regulations and orders are additional legislative measures introduced to strengthen the management of waste including the control of single use plastic bags, plastic straws and polystyrene boxes, littering and licensing of private waste operators.

The National Waste Management and Pollution Control Strategy and Implementation Plan 2016-2020 provides for the establishment of an inter-sectoral coordination mechanism through the National Waste and Pollution Control Coordinating Committee. At present, a Working Group coordinated by the Department of Environmental Protection and Conservation oversees implementation of the strategy. This is due for revision and is a potential area for reform.

Recommendations

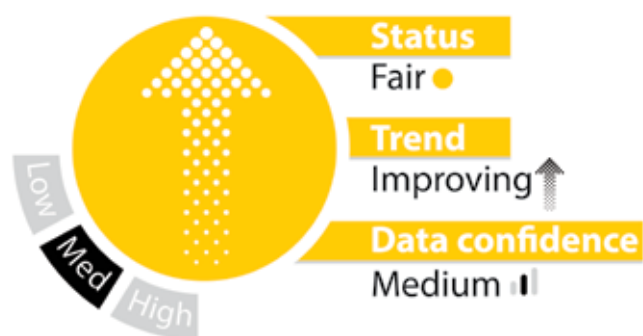
To improve the adverse impact to the environment from waste, a number of recommendations have been proposed by the APWC Vanuatu Waste data Report (Wander et al. 2018), as well as in the ADB (2014) country snapshot of Vanuatu. These recommendations remain valid.

- Improve provincial and municipal governance systems – especially in the waste collection side and the financial viability of the system. This will require strengthening and reforming of the financial and institutional regimes.
- Capacity development – given there is limited government capacity in waste management, novel ways to fix the solution albeit temporarily is to recruit international volunteers to provide mentorship to locals in waste management. This programme should include provinces and municipalities.
- Sustainable financing – there is an urgent need to review the current system of recovering financial resources through dump fees, and a waste levy. Similarly, explore funding opportunities through projects and international collaboration to allow waste management programs to be expanded to rural and remote communities.
- Co-ordination – Strengthen the national coordination capacity of key stakeholders in waste management activities. This may include working with provinces and communities to develop waste management plans and assist with their implementations.
- Legislation – Strengthen existing legislation to help reduce littering, illegal dumping and burning throughout the country.
- Collection service – Improve the collection system by reducing the areas covered under the PVMC existing collection services and promote the participation of private contractors. Improve collection services in rural and outer areas using a system such as a prepaid bag system.
- Public awareness – Raise the conscience of the country on the need to do the right thing in order to protect the environment and the future of all ni-Vanuatu.
- Disposal service – Improve the management of landfills through more controlled access and regular maintenance.
- Recycling – Encourage and provide support to local companies engaged in recycling.
- Litter control – Secure equipment to control waste in rivers and waterways to reduce their impact to the marine environment. Provide equipment to help communities dispose of their rubbish correctly.
- Curriculum – Support the development of waste awareness materials to be included in the school curriculum.



The Paunagisu community on Efate Island held a community clean-up to coincide with the national ban on single use plastics. Many single use plastics find their way to the mangroves and the reefs of the Paunagisu community. DEPC assistance include participating alongside the community members.

3.5.3 Sanitation



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	   	 Convention on Biological Diversity	SAMOA Pathway 64 Noumea Convention	National Sustainable Development Policy ENV 2; 3; 4; 5; ECO 2; 3; SOC 3; 6 National Environmental Policy & Implementation Plan Health Strategy 2020 Sanitation and Hygiene Policy 2015 Public Health Amendment Act (part 8) Health Strategy 2020 Sanitation and Hygiene Policy (2018)

Indicator Definition

Sanitation is strongly linked to the prevention and the spread of disease, as well as positive social and economic outcomes, including increased school attendance, employment and food security, reduced hunger and poverty, and energy production. The indicator assesses the percentage of the population having adequate sewage management.

Status and Key Finding

Vanuatu uses a number of sewage disposal systems ranging from pit latrines, ventilated improved pit latrines (VIP latrine), flush toilets and others (VNSO 2020). WHO defines improved sanitation as toilets that include flush toilets, water seals, ventilated improved pit latrines (VIP latrine), pit latrine with slab, and composting toilets. At the end of the Millennium Development Goals target year of 2015, Vanuatu achieved 58% access to improved sanitation, which was below the national target of 68% (JMP 2015). Five years later, Vanuatu achieved a 72% access to improved sanitation (VNSO 2020). The improved access continues to be high in rural

areas up until 2010, and then it appeared to have stagnated (Sanitation and Hygiene Policy 2015). Personal pit latrines, flush toilets and ventilated improved pit latrine were the most common sanitation facilities throughout the country (Figure 99).

There is an observable trend towards the reduction in open defecation and flushing of latrines directly to open areas.

In urban areas where water is piped into premises, most have flush toilets. Large numbers of these toilet facilities are shared amongst families due to the high cost of installing septic tanks. In rural areas where pit latrines are common, the conditions and the quality of the latrines are poor. Piped water into rural families continues to improve, which is ideal for the installation of flushed toilets. However, due to the high cost of toilet equipment most households are not able to afford them. Therefore, access to improved sanitation is not as high as it could be.

Of the provinces, Torba and Malampa are leading the way with 80% of their households having access to improved sanitation (Figure 101). Rural households have better access to improved sanitation (75%) than those in urban areas (60%). Of the two urban centres, 72.5% of households in Luganville have access to improved sanitation, compared to 56% in Port Vila (VNSO 2020).

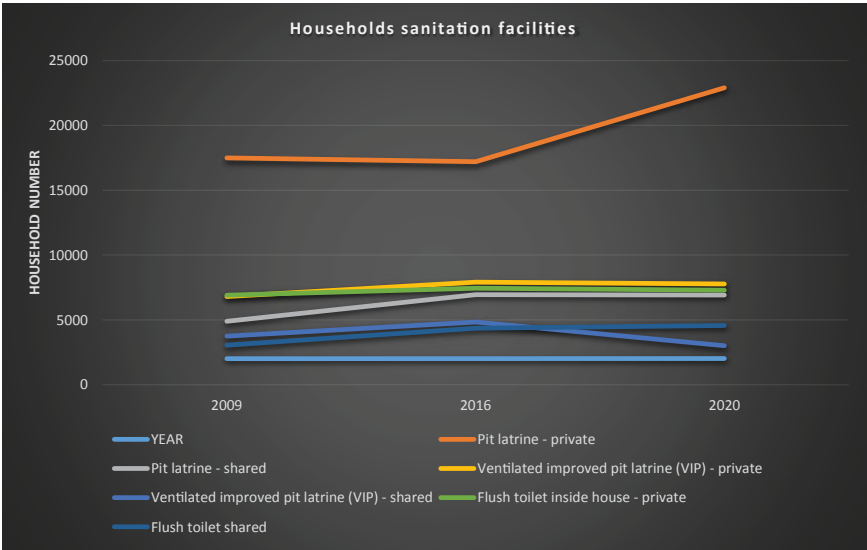


Figure 99: Access to sanitation facilities for 2009, 2016 and 2020. (VNSO 2009, 2016, 2020)

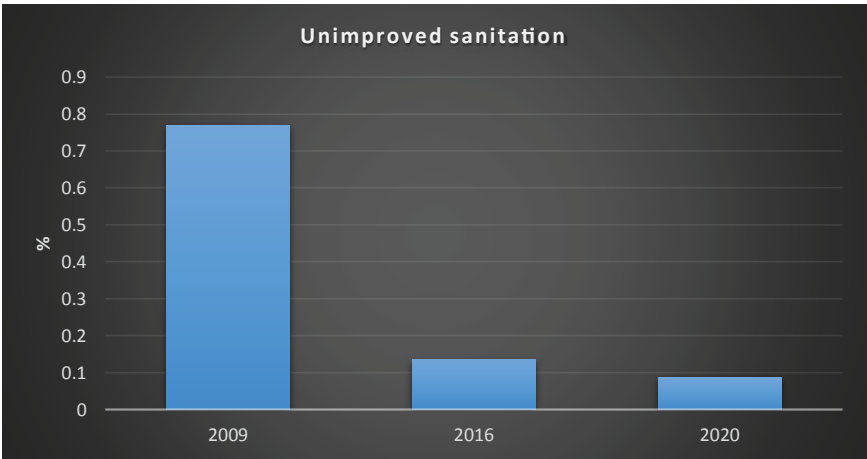


Figure 100: Households that do not have access to improved sanitation for 2009, 2016 and 2020 period. (VNS, 2009, 2016, 2020)

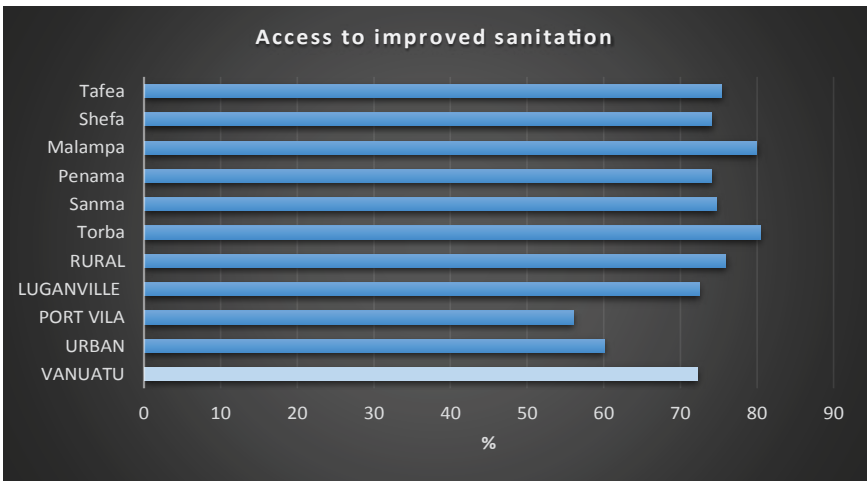


Figure 101: Vanuatu households with access to improved sanitation. (2020 National population and housing census)

Over the past couple of decades, households have increased the use of private pit-latrines and shared flush toilets (Figure 102 and Figure 104). The number of private flushed toilets has declined sharply (Figure 103), as well as shared VIP latrine (Figure 105). Some decrease in private VIP latrines (Figure 106), whereas shared pit-latrines remain steady (Figure 107).

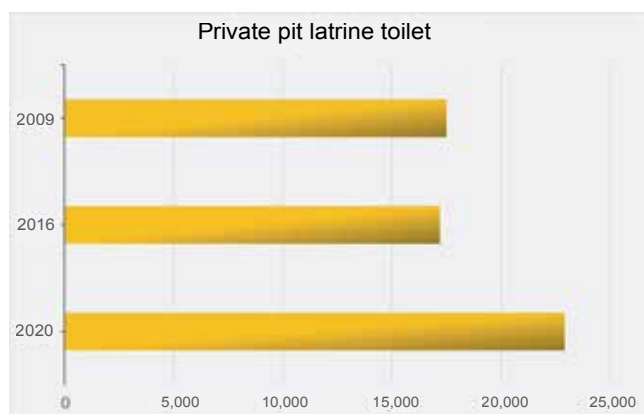


Figure 102: Households with private pit-latrines

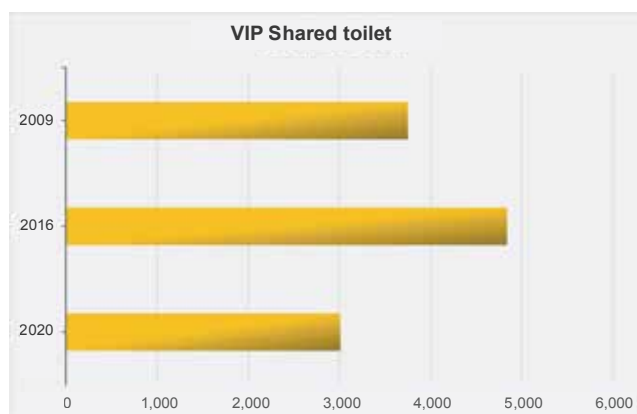


Figure 105: Households with shared VIP latrines

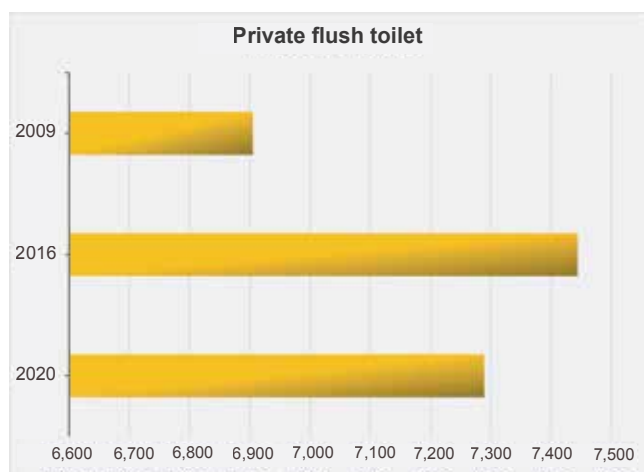


Figure 103: Households with private flush toilets

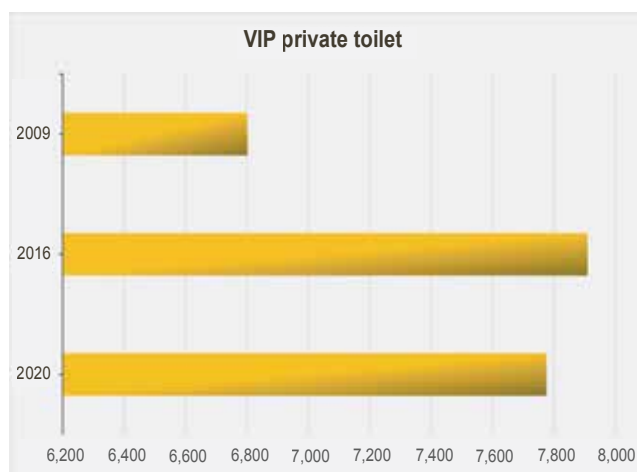


Figure 106: Households with private VIP latrines

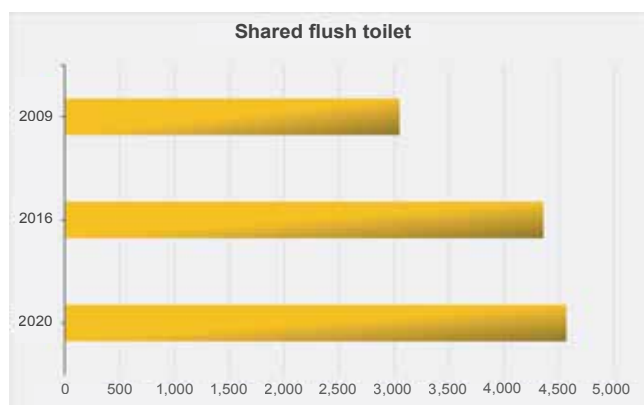


Figure 104: Households with shared flushed toilets

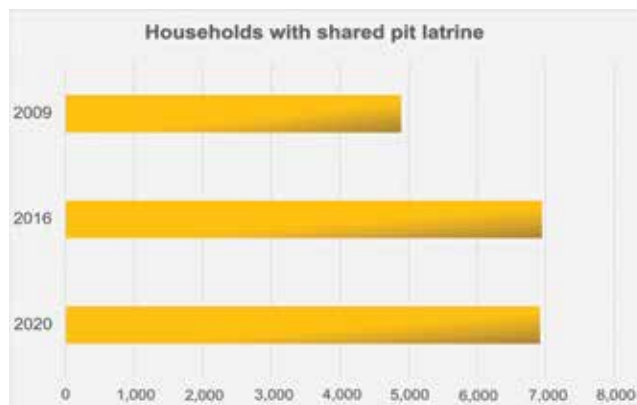


Figure 107: Households with shared pit latrine

Impact

If sanitation is not adequately addressed it will lead to more health problems and mortality especially of vulnerable children, the elderly and those with immune compromised systems. The environment will also be affected, as contamination of water sources can lead to pollution and aquatic environments becoming anoxic. Mortality in native species is expected especially if their habitats are polluted. In some instances, invasive species such as mosquitoes may proliferate, causing diseases. The smell may also be offensive to nearby residents. The increasing population will continue to challenge sanitation management now and in the future.

Response



Vanuatu established the WASH (Water, Sanitation and Hygiene) Sector in 2012 as the main coordinating partnership amongst the various national stakeholders to manage water and sanitation during national emergencies. The Department

of Geology, Mines and Water Resources oversees water management under WASH, whereas the Ministry of Health manages the sanitation and hygiene. The Ministry of Health roles and responsibilities for hygiene and sanitation are given in the Standard Operation Procedures (Table 39).

Table 39: Some of the key roles and responsibilities of the Ministry of Health under the WASH Cluster. (DoWR Standard Operating Procedures, No Date).

MOH – RESPONSIBILITIES
Implement appropriate excreta containment measures
Carry out rapid consultation with the affected population
Carry out concerted hygiene promotion campaign
Consult and secure the approval of all users on the siting, design and appropriateness of sanitation facilities
Provide the affected people with the means, tools and materials to construct, maintain and clean their toilet facilities
Toilets are appropriately designed, built and located to meet the needs of all people affected
At least a maximum of 20 people use each toilet
Provide an adequate supply of water for hand washing and for toilets

National legislation that governs sanitation including the Public Health Amendment Act (part 8), the Health Strategy 2020 and the Sanitation and Hygiene Policy 2018. Additional policies and legislation are outlined under the Sanitation and Hygiene Policy 2017-2030.

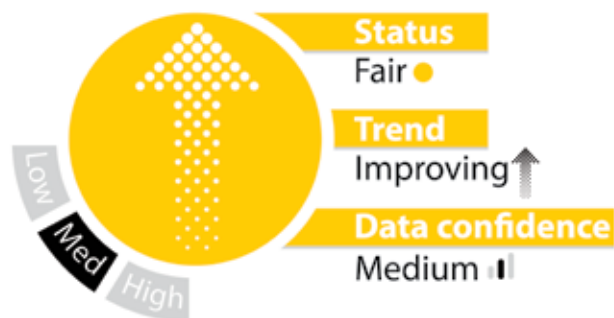
The Sanitation and Hygiene Policy 2017-2030 encourages Provincial Councils to establish bylaws that strengthen sanitation and hygiene compliance. The Policy also highlights funding support to enable Councils to improve public infrastructure.

Recommendations

The sanitation and hygiene challenge in Vanuatu is severe. There is a serious need to improve the existing sanitation system in Vanuatu.

- Technical capacity has been a problem in the water and sanitation sector. This needs urgent addressing to ensure that there are human resources to manage and repair the sanitation infrastructure.
- Financial resources are seriously lacking, which have contributed to the lack of progress in improving the sanitation infrastructure. This challenge needs to be a priority at the national level and communicated to development partners for assistance.
- The legislation in the sanitation sector needs reviewing and strengthened. It also needs to be implemented and enforced to ensure that human health is protected and the environment is not at risk.
- Public awareness is key to improving hygiene and therefore the health and safety of all Vanuatu people.
- Encourage the adoption of environmentally friendly and affordable sanitation technology and infrastructure that rural communities can use.
- Implement a water monitoring programme, especially at key sensitive sites and sites which communities use for recreation and for harvesting food, to ensure that these areas are safe for use.

3.5.4 Potable Water



Every Ni-Vanuatu citizen should have access to safe water in sufficient quantities to meet basic needs, including drinking, cooking and sanitation. The relatively abundant supply of fresh water in Vanuatu should further increase livelihoods opportunities and be fully harnessed to improve the overall economic standing of the country, both now and in the future.

Department of Water Resources 2022

	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	 	 Convention on Biological Diversity	SAMOA Pathway 64	National Sustainable Development Plan ENV 4 Natural Resource Management National Environmental Policy & Implementation Plan Water Resources Management Act

Indicator Definition

The indicator assesses the management and the access by households to safe and improved drinking water.

Status and Key Finding

Water supply falls under several authorities in Vanuatu. The Department of Water Resources within the Ministry of Lands and Natural Resources has the responsibility for rural water supply systems countrywide. The Public Works Department under the Ministry of Public Utilities and Infrastructure is responsible for the Luganville town piped water supply and for a number of provincial centres countrywide. UNELCO is a French-owned private utility contracted by government to provide electricity to the two urban centres. For 12 years UNELCO has also managed and operated the Port Vila water supply system. The Ministry of Health (MoH) is responsible for water quality surveillance of all water supply systems, reinforced by the 1994 Public Health Act.

The number of households throughout Vanuatu that have access to improved drinking water sources continues to improve, with 92% in the latest Census information (VNSO 2020). Port Vila and Luganville, the two urban centres, have

near 100% of households having access to safe drinking water (Figure 108). Tafea province has the lowest number of households with access to safe drinking water (75.3%), compared with other provinces. Shefa has the highest (92.6%) access to safe drinking water (VNSO 2020). The national increase in access to improved drinking water is in contrast to two decades ago, when the national figure was 74% in 1998.

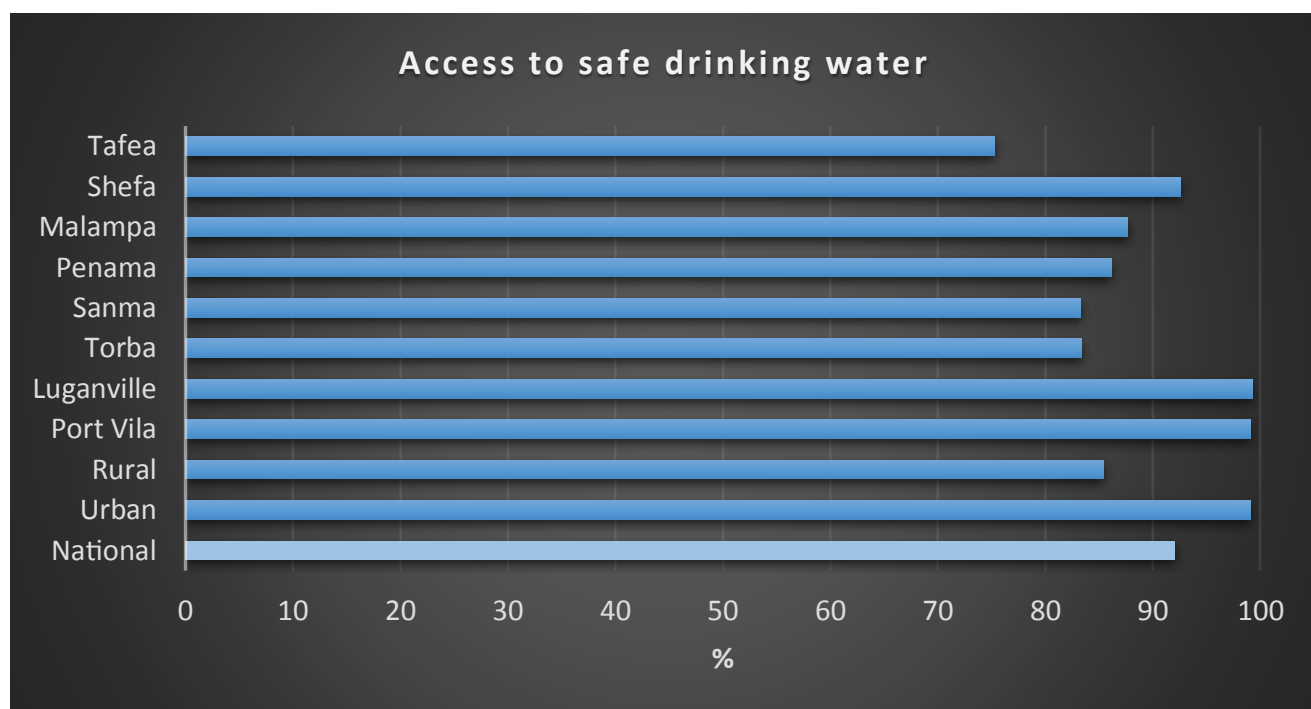


Figure 108: Percentage of households that have access to improved drinking water. (VNSO 2020)

Piped water (both private and shared) is the main source of drinking water for Vanuatu households, especially those residing in Efate and Santos (Figure 109). Tank waters at private residences or shared amongst villagers are also common (Figure 109).

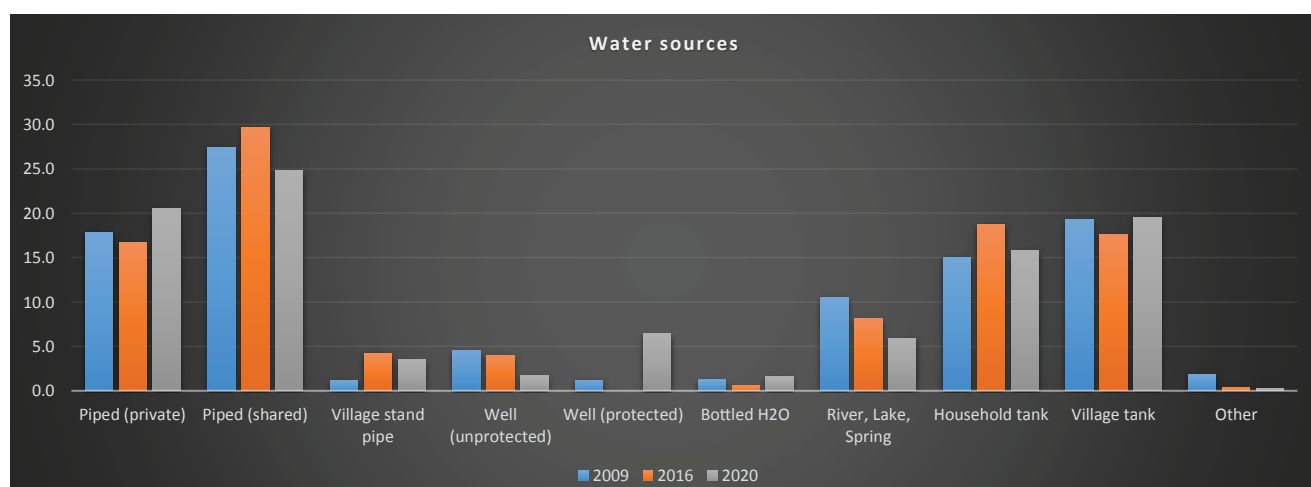


Figure 109: Percentage of households with main water sources in the years 2009, 2016 and 2020. (VNSO 2009, 2016, 2020)

The ideal is that all households have access to their own safe drinking water source, preferably through a piped system. The piped private water source increased from 18% in 2009 to 21% in 2020 (Figure 110 and Figure 112), although there was a slight reduction after Cyclone Pam in 2015 (Figure 111).

An assessment of water supply and coverage in rural areas conducted in 2014 to 2016 across 44 islands, found that rural communities have a relatively high coverage of improved water supplies (DoWR 2018). The assessment also found significant inequalities amongst the provinces.

Across the country, 93% of surveyed water supplies were classified as improved, which is broadly consistent with the 2015 WHO/UNICEF Joint Monitoring Programme's (JMP) estimate that 89% of the rural population of Vanuatu has access to an improved water source. Rural communities use groundwater, surface water and rainwater, with the latter the most common.

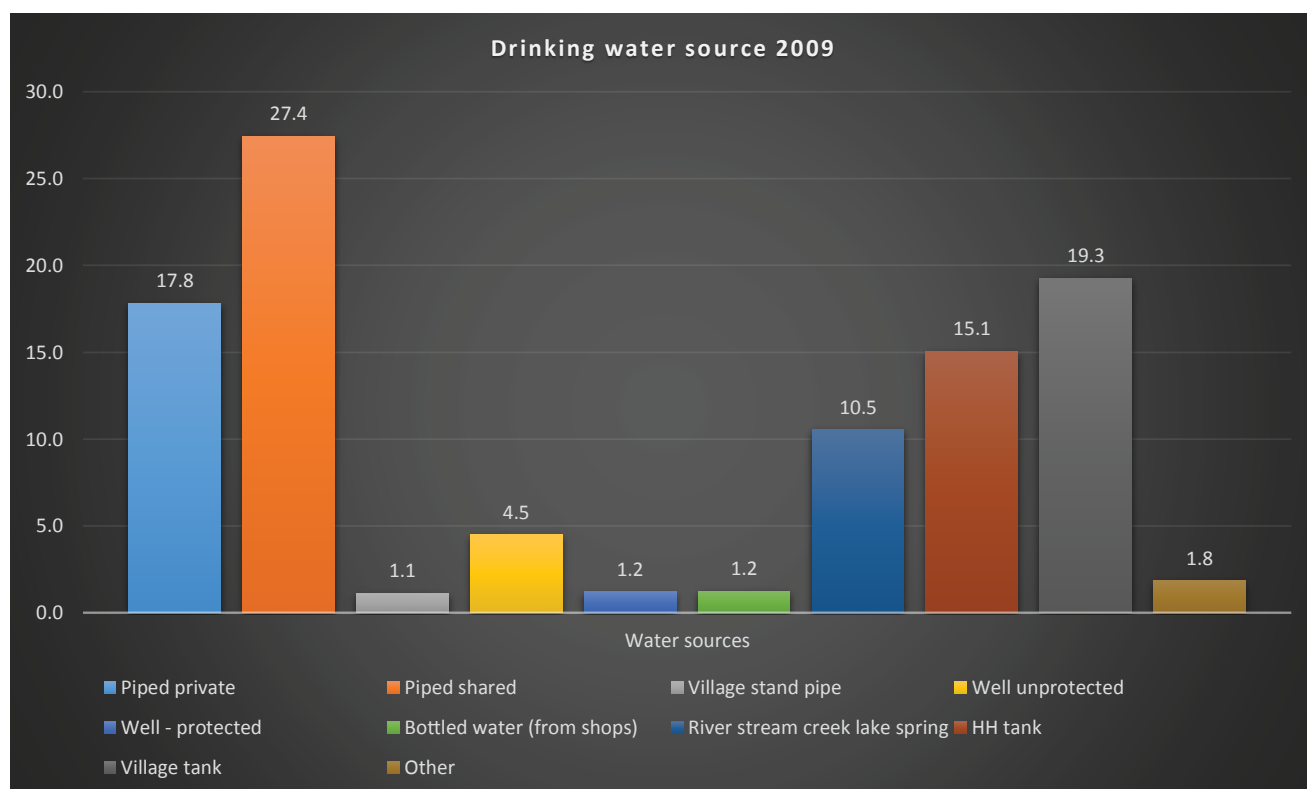


Figure 110: Main drinking water sources in 2009. (VNSO 2009)

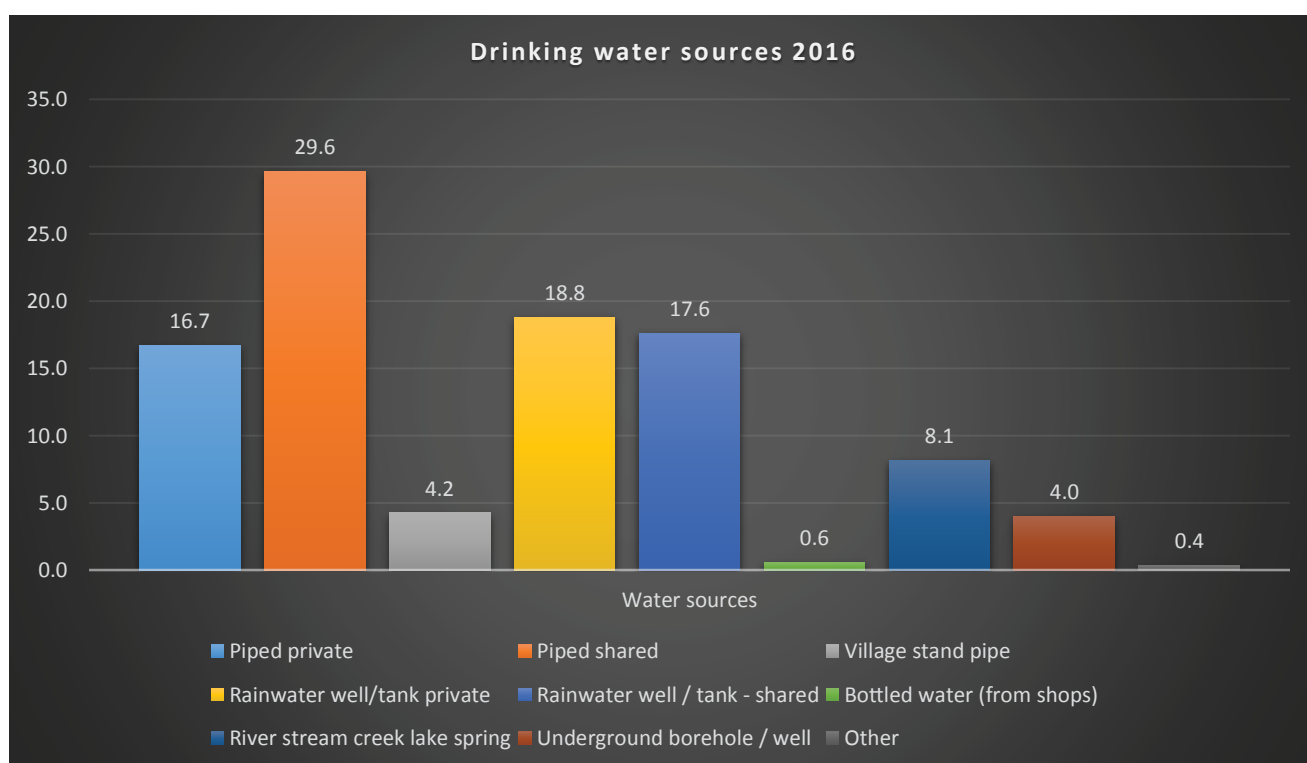


Figure 111: Main drinking water sources in 2016. (VNSO 2016)

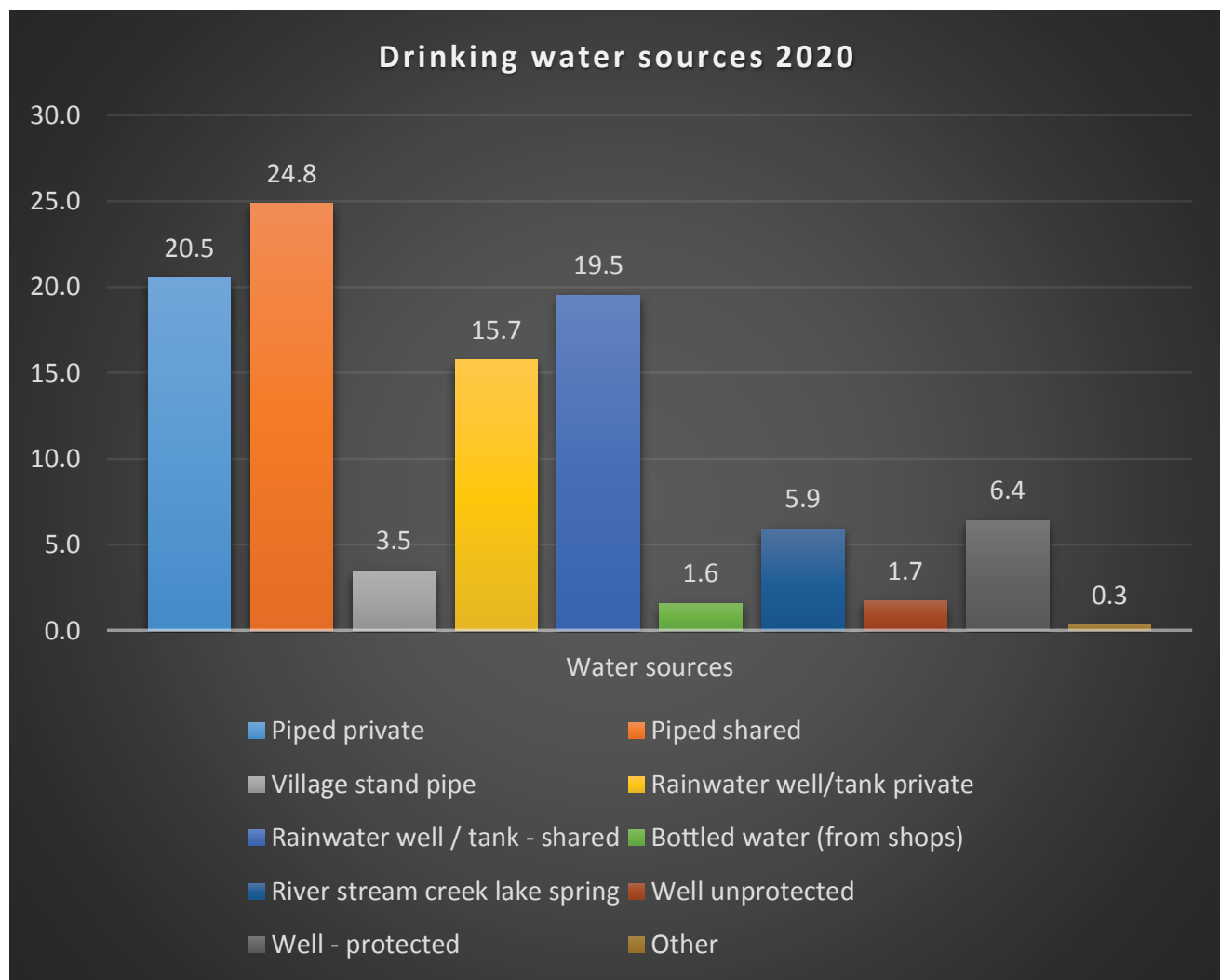


Figure 112: Main drinking water sources in 2020. (VNSO 2020)

Water quality

The water quality is generally very good in Port Vila and Luganville, with water being treated by chlorination. A concern for these urban area water sources is the declining level of the aquifers when water demand continues to increase. Furthermore, human activities around the catchments are contributing to contamination and pollution of the aquifers. There has been a concerted effort by the Government and partners to have protection zones around catchment areas.

For rural areas, water is sourced from surface water, rainwater and groundwater, which are subjected to weather patterns. For example, the recent volcanic activities on Ambae with ash being emitted have contaminated water sources on Ambae, Pentecost and Maewo islands.

While a high proportion of the rural population in Vanuatu have access to basic water supplies, significant improvements in the management, operation and maintenance of these systems are needed. In the urban centres of Port Vila and Luganville, there is a similar situation where the infrastructure is aging and in need of replacement. The lack of funding for maintenance of the infrastructure is one of the impediments. The sector would also benefit from a review of the management structure including the governance and institutional arrangements.

Impact

As Vanuatu's population grows, demands on existing water sources will increase. These demands when combined with the increasing risk of pollution and climate-related changes could be expected to limit the future availability of potable water, constrain its productive use and impact negatively on Vanuatu's most precious resource, its pristine natural environment.

Response

Under the Ministry of Lands and Natural Resources, the National Water Strategy aims to address the challenges that limit sustainable development of the water sector including factors related to finances, human resources, institutions and operations. In doing so, it gives effect to certain directives of the ni-Vanuatu Government such as for Physical Planning Areas (PPAs) requiring detailed strategies and plans for all the Government Departments.

The Department of Water Resources, who is responsible for the implementation of the Water strategy, has three key units:

- I. Monitoring and Evaluation Unit
- II. Technical Services Unit
- III. Projects and Operations Unit.

The key pieces of legislation governing the water sector are the Water Resources Management Act 2002, the Water Supply Act 1985 and the Public Health Act 1994

Monitoring the quality of water is aided by the six laboratories in Port Vila and Luganville located at UNELCO, Ministry of Health, VCH, Department of Geology and Mines, the Department of Public Works, and the ND Hospital in Luganville.

Recommendations

Safe and sufficient water is vital for the wellbeing of all Vanuatu, but is also key to economic developments. Ensuring the safety of water resources is a priority for the nation. The following recommendations assert this national aspiration.

- There is a need to raise the awareness and conscience of all Vanuatu on the importance of safe drinking water and the need to use it efficiently and minimise any loss.
- Human activities around catchment areas need to be regulated and monitored to ensure that they are not contaminating or polluting these important areas. Creating buffer zones around key catchment areas is important,
- The need to improve the existing piped infrastructures around urban areas has been highlighted for the past few years. Securing funding and technical capacity support from development partners would aid in addressing this important challenge.

Built Environment References

- ADB, 2014. Solid Waste Management in the Pacific Vanuatu Country Snapshot. Asian Development Bank Publication Stock No. ARM146618-2 June 2014
- Department of Customs and Inland Revenue, 2015. Petroleum product import 2010–2015. Government of Vanuatu.
- Department of Water Resources, 2018. Vanuatu National Implementation Plan (NIP) and Capital Assistance Program (CAP) for safe and secure community drinking water. 38p.
- DEPC, 2016. National Waste Management, Pollution Control Strategy and Implementation Plan 2016-2020. Republic of Vanuatu.
- Dornan, M. 2014. Access to Electricity in Small Island Developing States of the Pacific: issues and challenges. Renewable and Sustainable Energy Reviews. 31: 726-735.
- Global Green Growth Institute. 2016. Vanuatu energy demand projections: Business as usual scenario. Korea. 74p.
- Government of Vanuatu. 2016. Updated Vanuatu National Energy Road Map 2016-2030. 77p.
- Hoornweg, D., & Bhada-Tata, P. 2012. What a Waste. A global review of solid waste management. The World Bank. Washington, USA. 116p.
- IRENA, 2015. Vanuatu Renewables Readiness Assessment. International Renewable Energy Agency. 52p.
- Khelawan, K. 2018. Penetration of variable renewables in the Pacific Island Countries – Small Grids and Off Grid. World Bank Group. (ppt presentation – 11p).
- McIntyre, M. 2005. Pacific Environmental Outlook. Special edition for the Mauritius International Meeting for the 10-year Review of the Barbados Programme of Action for the Sustainable Development of Small Island Developing States. UNEP & SPREP. Apia, Samoa.
- O'Reilly, M. No Date. Luganville Waste Characterisation. Vanuatu. 1p.
- PacWastePlus-SPREP, 2021. Waste Audit Report Vanuatu 2020. Apia, Samoa. SPREP, 2021.
- Peel, J., Godden, L., Palmer, A., Gardner, R., Markey-Towler, R. & Innes, L-L. 2020. Stocktake of existing and pipeline waste legislation: Vanuatu. SPREP. Apia, Samoa. 13p.
- SPREP, 2017. 'PacWaste Country Profile, Vanuatu'. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme. Available at: <https://www.sprep.org/waste-profiles/pacwaste-country-profile-vanuatu>. [Accessed 22 November 2018]
- United Nations Development Programme, 2021. Circular economy opportunities in Vanuatu - A concise metabolic approach to defining a resource-efficient and low-carbon future. UNDP, New York. 46p.
- Utilities Regulatory Authority. 2020a. Electricity Fact Sheet. 2014-2019.
- Utilities Regulatory Authority. 2020b. Vanuatu monthly energy market snapshot of September 2020. Government of Vanuatu. Port Vila. 6p.
- Vanuatu National Statistics Office, 2009. National Population and Housing Census. Vol. 2. Ministry of Finance and Economic Management. Government of Vanuatu. 252 p.
- Vanuatu National Statistics Office, 2016. Mini-Census Report. 2016 Post – TC Pam. Vol. 1. Ministry of Finance and Economic Management. Government of Vanuatu. 248 p.
- Vanuatu National Statistics Office, 2020. National Population and Housing Census. Vol. 1. Ministry of Finance and Economic Management. Government of Vanuatu. 351 p.
- Wander, A., Sagapolutele, F., & Prince, A. 2019. Vanuatu – Waste Data Report. Analysis of waste generation and disposal data collected in November 2018. Centre for Environment Fisheries & Aquaculture Science. Asia Pacific Waste Consultant. 104p.

THEME 6:

CULTURE AND HERITAGE OVERVIEW AND HIGHLIGHTS



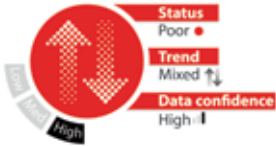
Image source: Australia Department of Foreign Affairs & Trade (CC BY 2.0)

Culture and Heritage Overview and Highlights

Vanuatu is one of the most culturally diverse nations due to migration from various parts of the Pacific. The islands are inhabited by Melanesians and Polynesians with intermixing occurring over many years. Each migration and groups brought with them the tools necessary for their survival. Pigs, in particular, were the prized possession of many of the different clans. The pig represents the cornerstone of ritual life, a token of wealth and power, on which societies were often founded. Vanuatu has four main socio-cultural areas: northern (has two variations), central has a Polynesian type of system where hereditary chiefs have the authority over the people, and the southern. Vanuatu's Culture and Heritage theme reflects the spiritual, cultural and ancestral connections between the people and their environment. The key indicators for this theme are:

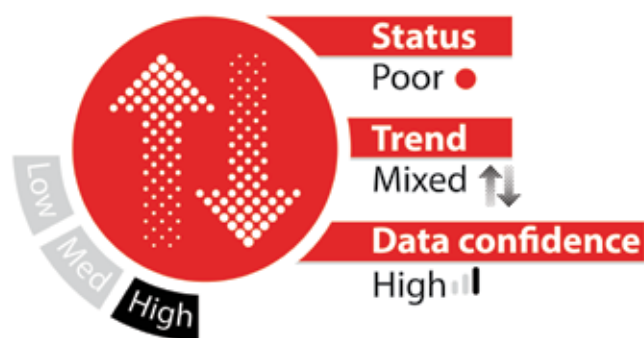
- State of historical sites of National Significance
- State of food production and consumption
- State of traditional knowledge (TK)
- State of traditional production
- State of vernacular languages in Vanuatu

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
State of indigenous languages in Vanuatu		Vanuatu is a linguistically diverse country. 138 indigenous languages, plus the 3 official languages (English, French and Bislama). Some languages are extinct or moribund. The adoption of Bislama has been the main threat to these languages. Strong commitment to the protection of the languages. Vanuatu residing in urban centres are losing their ability to speak their indigenous languages.	Enshrined in the Constitution the protection of indigenous languages as part of the National Heritage. Legislation and policies are in place to implement the pledge under the Constitution. The Ministry of Education introduced the vernacular language teachings from years 1-6 at the Primary school level

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
State of traditional knowledge		Traditional knowledge and cultural connection remains strong in rural and remote communities. Traditional practices such as telling a kastom story, perform a kastom dance or song or knowledge of a kastom game are key indicators of the connection to cultural knowledge. Over 60% of rural residents were knowledgeable in all the key matrices. Residents living in urban centres are losing their traditional knowledge.	A suite of legislation has been enacted to safeguard traditional knowledge. The engagement of the traditional elders and communities through the Council of Chiefs, the National Cultural Council, and the VCC's Filwoka's Network is one of the many ways used to strengthen traditional knowledge. Education Dept – includes TK in the curriculum.
State of traditional production		There is a general decline in the ability to undertake traditional production of some basic activities such as weaving mats, thatching roofs, making traditional medicines or building a canoe throughout the country. Although this decline is more noticeable in urban centres than rural areas.	The protection of cultures, cultural artefacts and traditional knowledge has been codified in national legislation. Establishing the Vanuatu Kaljoral Senta as the working arm of the Government and the people in safeguarding Vanuatu's natural heritage has been a positive action.

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE AND RECOMMENDATIONS
State of food production and consumption		Food security is an issue of concern for the country. 83% of households throughout the country have the knowledge in food production, although the percentage is much higher in rural communities (97%). Food production and food security are linked with land rights and access to customary land. Traditional diet is changing with the adoption and access to imported foods. This has caused an increase in non-communicable diseases in Vanuatu.	A first plan of action for the country's food and nutrition was released in the late 1990s, under the umbrella of the Ministry of Health. Under the National Sustainable Development Strategy, food and nutritional security is one of the critical areas under the Environment Pillar. It recognises that the state of the natural environment is critical to Vanuatu's food needs. Furthermore, the NSDS highlights the importance of traditional knowledge in relation to food production and preservation, as part of the country's response to climate change. The Vanuatu Cultural Centre has implemented a 'slow food programme' on some islands for the past few years, which aimed at promoting and preserving the traditional methods of food preparation.
Sites of National Significance		A historical site classification system has been developed including cultural sites, archaeological sites, historical sites and World War 2 sites. Over 2000 sites have been surveyed. Chief Roi Mata's domain is a World Heritage listed site.	The Vanuatu Kaljoral Senta continues to survey and register sites throughout the country. Recommendation Time is of the essence with the registration of these sites, as many are being affected by climate change and natural disasters, as well as the loss of traditional knowledge that is often associated with certain sites.

3.6.1 Indigenous Languages



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS			 	SAMOA Pathway 78, 80, 81 I, 87, 108	NSDP – SOC 1; 2; 4; ECO 3

Indicator Definition

Language is considered a vessel of traditional knowledge, packed with cultural cues and meanings. Indigenous languages are integral to ni-Vanuatu's identity. It is through these languages that traditional stories are told, places are named, songs are sung, and skills and knowledge are transferred. This indicator assesses the diversity and state of conservation of indigenous languages of Vanuatu.

languages, the region where the language is spoken and the numbers of speakers.

Status and Key Findings

With an estimated 138 different indigenous languages, Vanuatu is the country with the highest linguistic density in the world. It is estimated that Vanuatu has an average of 88 km² per language (François et al. 2015; Crowley 2000).

While they all belong to the Oceanic family, these languages have evolved over three millennia, from what was once a unified dialect network, to the mosaic of different languages that is known today (Figure 113) (François et al. 2015). ANNEX 3 – Languages of Vanuatu provides a list of the

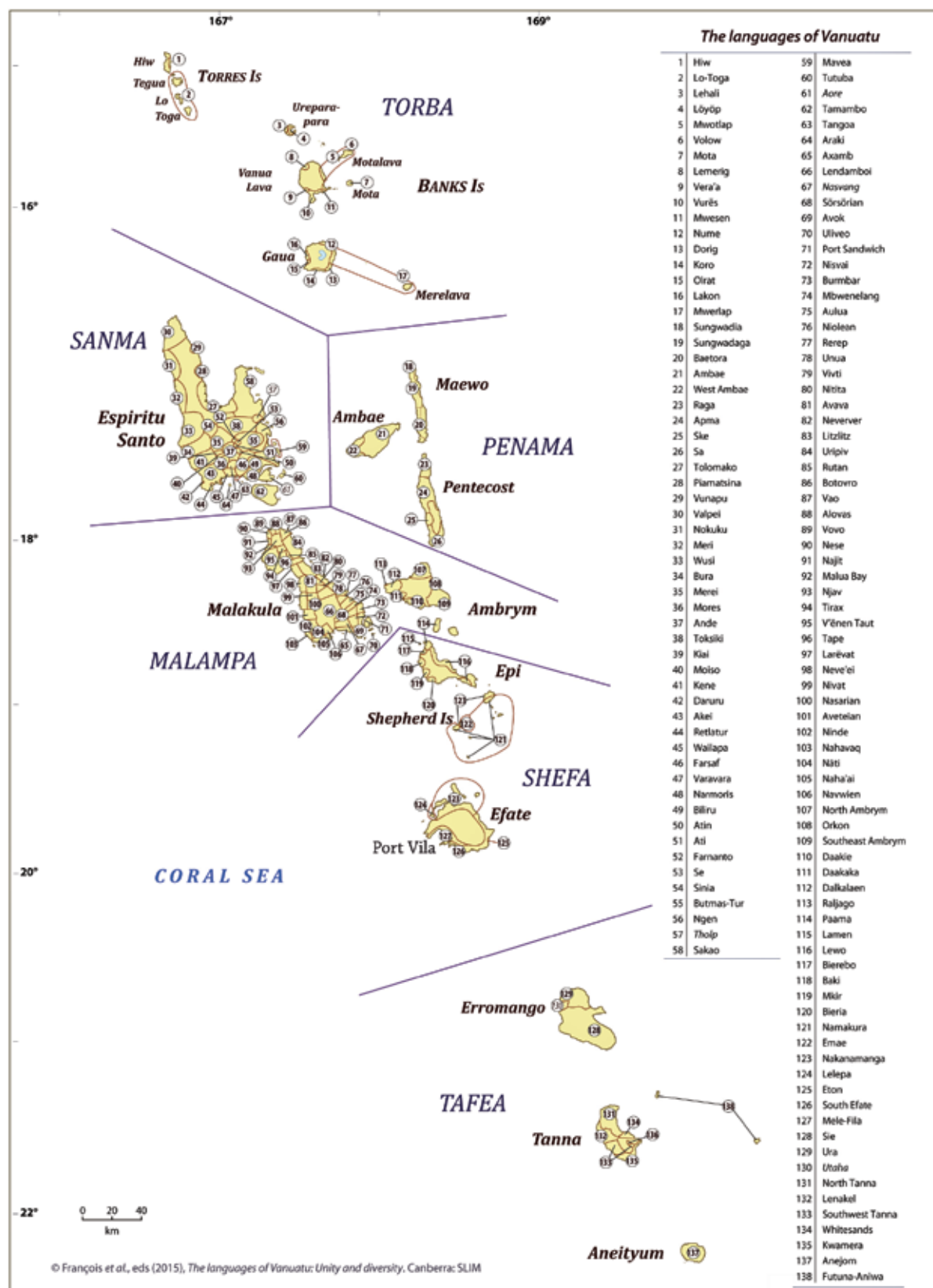


Figure 113: Reference map of Vanuatu's 138 languages. (Alexander Francois and Benjamin Touati)

Indigenous languages are the first languages learned by 80% of the population, age 3 and higher. Those living in rural areas make up the highest proportion of people speaking indigenous languages compared with those in urban centres, who tend to speak Bislama. The number of children learning an indigenous language continues to decline (66% of those ages 3-12 years), whereas the figure for the older generation (65 years and older) is higher at 95%. A high proportion of the population (ages 12 years and over) can read (67%) and write (63%) an indigenous language. However, Bislama is the most read and written language with 90% of the population, followed by English (three-quarters of the population) and French (less than one-third).

The exact number of active languages in Vanuatu remains uncertain, as many languages were already on the verge of extinction when they were discovered. Some were only spoken by a few, or remembered by a handful of people, often the older generation (Figure 114). About 18 languages are considered moribund.

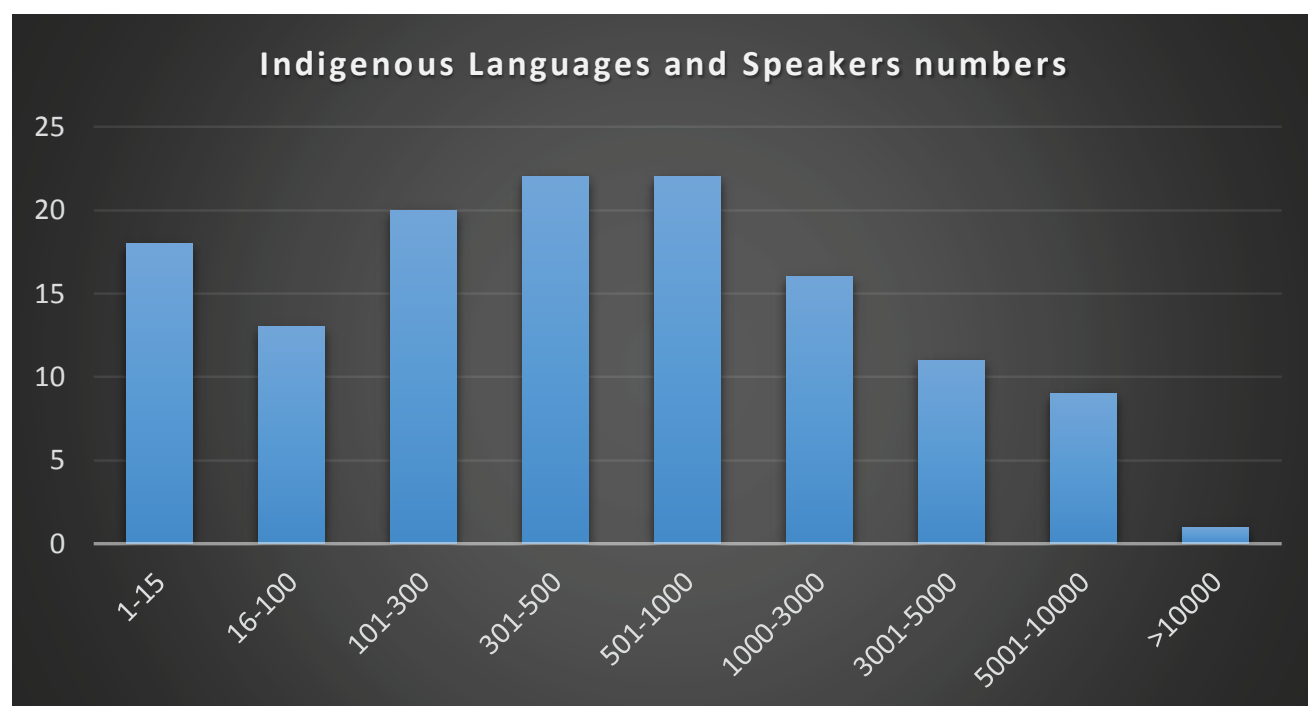


Figure 114: The languages and the estimated range of speakers. For example, 18 languages have only 1-15 speakers (first column), whereas the second column shows 13 languages with 16-100 speakers. (François et al. 2015)

Impact

The end of the 19th Century and the beginning of the 20th saw a decline in Vanuatu's population due to the introduction of new diseases and the removal of villagers for forced labour work (Crowley 1997; François 2012). These tragic episodes contributed to the decline and extinction of many of Vanuatu's indigenous languages and dialects. One of the biggest threats now is the widespread use and adoption of Bislama, which has contributed to the decline in other indigenous languages. There is strong evidence of this happening in the two urbanised centres of Vanuatu – Port Vila and Luganville, where immigrants quickly abandon their vernacular languages and adopt Bislama, as their main lingua franca (Vandeputte-Tavo 2014; François et al. 2015). A survey published in 2012 found a reduction of indigenous language speakers in 2009 (63.2%) from 73.1% in 1999 (Table 40; Figure 115).

Table 40: Comparing languages used at home in the rural, urban and national settings. (François et al. 2015)

	1999			2009		
	INDIGENOUS LANGUAGE	BISLAMA	OTHER	INDIGENOUS LANGUAGE	BISLAMA	OTHER
Rural	85.3	13.3	1.4	77.1	21.7	1.2
Urban	29.3	56.4	14.3	20.5	70.9	8.6
National	73.1	23.3	3.6	63.2	33.7	3.1

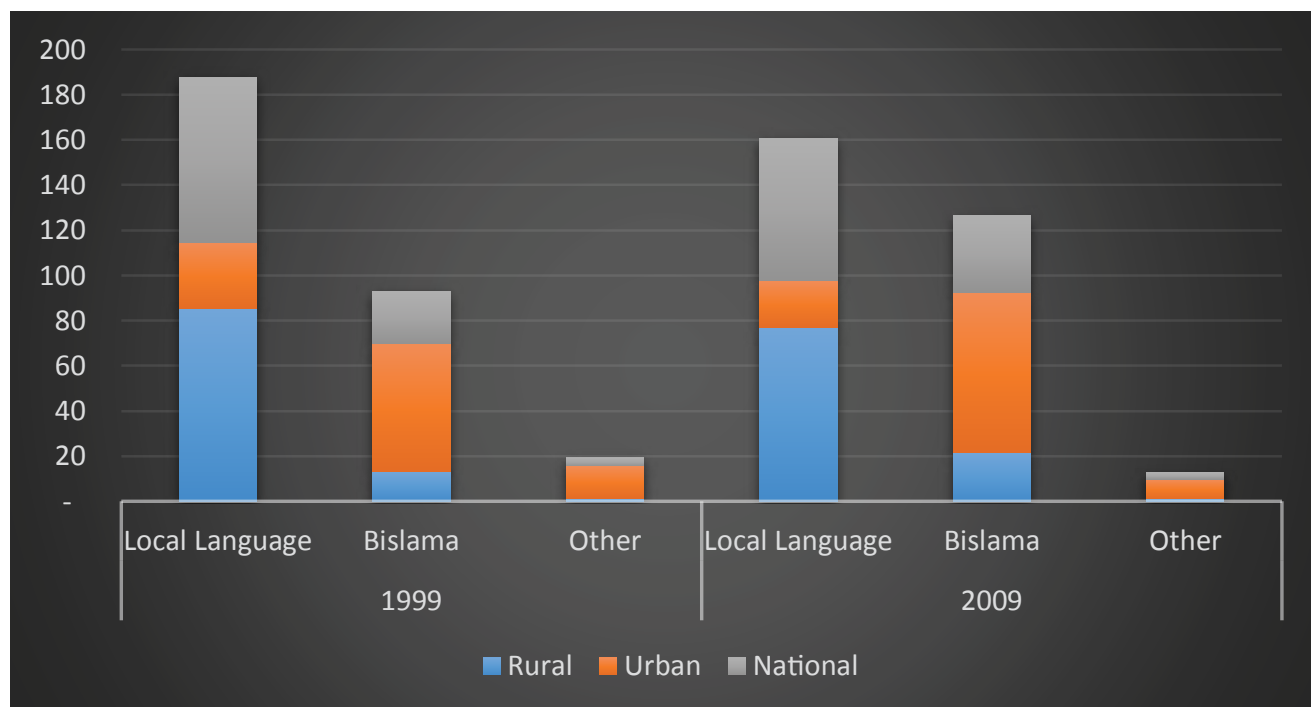
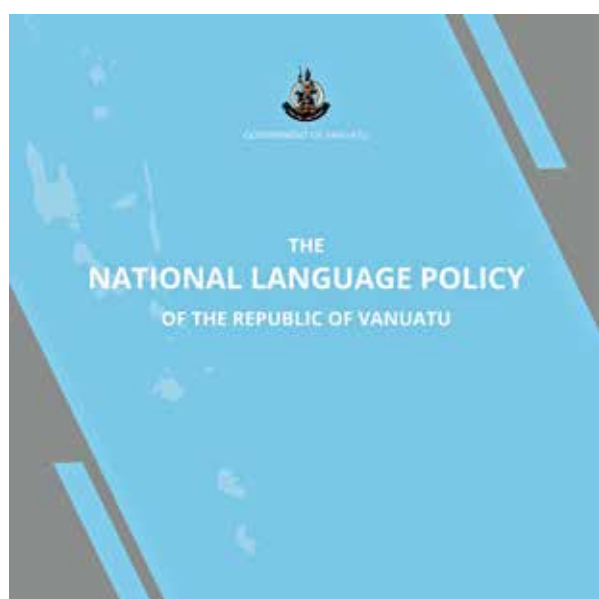


Figure 115: The percentage of speakers of indigenous, Bislama and other languages in rural, urban and the national setting. (Francois et al. 2015)

Response

Vanuatu, on gaining its independence saw a renewed interest and commitment to the preservation of its languages and cultures. Legislation was enacted as part of its effort to promote and safeguard indigenous languages. The supreme law of the country, the Vanuatu Constitution, advocates the protection of Vanuatu's native languages because they are part of its national heritage (Article 3(2)). The Education Act 2001 was another important legislative change that encouraged the inclusion of indigenous languages in the formal education system. The Vanuatu National Language Council Act 2005 was passed, which enabled the establishment of the Vanuatu National Language Council with the sole purpose of promoting and safeguarding linguistic diversity in the country.

The establishment of the Language Services Department (within the Prime Minister's portfolio) operates under the aforementioned legislation and provides the personnel to implement the various language policies (<http://www.lsd.gov.vu>). One of the key responsibilities of the LSD is raising awareness and promotion of official and vernacular languages. The National Language Policy 2020 provides the blueprint in the operations of LSD.



The establishment of the Vanuatu's Cultural Centre and the national museum reflects the country's commitment to document, preserve and promote the traditional knowledge and languages.

The National Council of Chiefs, representing the traditional governing system, has a constitutional mandate to preserve and promote Vanuatu's languages and cultures. The preservation of the traditional systems encourages indigenous languages to survive and thrive.

The National Tourism Office also encourages the preservation and promotion of indigenous languages and cultures through the promotion of eco-tourism, cultural villages, and other tourist related events based on the cultural calendar. These are examples of how the local people are encouraged to incorporate the preservation and promotion of traditional knowledge and language into the modern economy.

The Department of Environmental Protection and Conservation's Environment Unit also encourages the preservation of biodiversity and linguistic ecology associated with the different aspects of biodiversity.

The role of the Education Department in the preservation of indigenous languages is important. From 2016 to 2021, the department has been engaged in a progressive implementation of the years 1 to 6 revised curriculum in the primary schools. The revised curriculum for the senior secondary schools was implemented in 2019-2021. A revised curriculum for Year 7 in junior secondary schools is being rolled out in 2022. The new curriculum is the first to be developed with respect to the views and opinions of the people of Vanuatu. It acknowledges Vanuatu as being part of the global community but it also makes it clear of the need to be self-reliant and to offer a curriculum relevant to Vanuatu based on the country's cultures and beliefs. The curriculum contains a set of values, including:

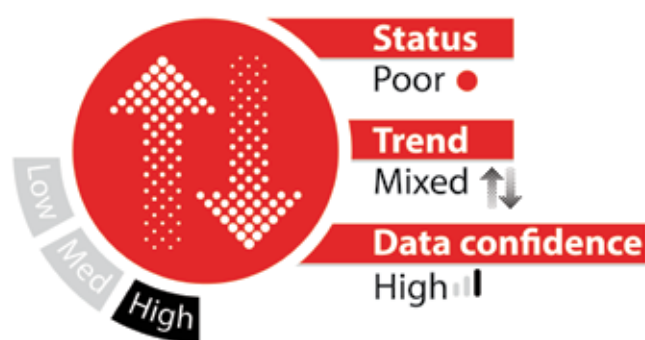
- Aesthetic values,
- Cultural values,
- Ethical, Moral and Spiritual values
- Personal Values
- Social Values
- Work Values

The aesthetic values focuses on traditional activities and the appreciation and caring for the environment. Vanuatu has a long history of oral traditions and practices associated with the transmission of knowledge. These are the heritage of Vanuatu that should be nourished and shared with the next generation.

Recommendations

- Indigenous languages are integral to culture, traditional knowledge, production and consumption, and to the identity of every ni-Vanuatu. These are the national assets of the country and must be preserved.
- National and provincial programmes should be developed and implemented to raise awareness on the importance of indigenous languages.
- Incorporate indigenous language into the education system, such as in the Early Childhood Education Policy, which promotes vernacular training, provide opportunities for individuals to thrive.
- Continue to encourage and promote the use of languages to be an integral part of Vanuatu's unique and modern economy.

3.6.2 Traditional Knowledge



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA Pathway 80, 81 (e), 108 Pacific Coral Reef Action Plan 2021-2030 (Action Area 2)	NSDP – SOC 1; 2; 4; ECO 3

Indicator Definition

Indigenous languages are the vessels of traditional knowledge and society. Understanding including being able to speak an indigenous language, uncovers a message that is bound to social and cultural activities in communities in Vanuatu. These local languages are largely unwritten, having survived this long as living languages transferring information through story, song, dance and play. The indicator assesses the percentage of the nation that are able to perform selected traditional knowledge practices that are part of everyday living for the people of Vanuatu.

Status and Key Findings

The four key traditional practices assessed are:

- Kastom story
- Kastom dance
- Kastom song
- Kastom game

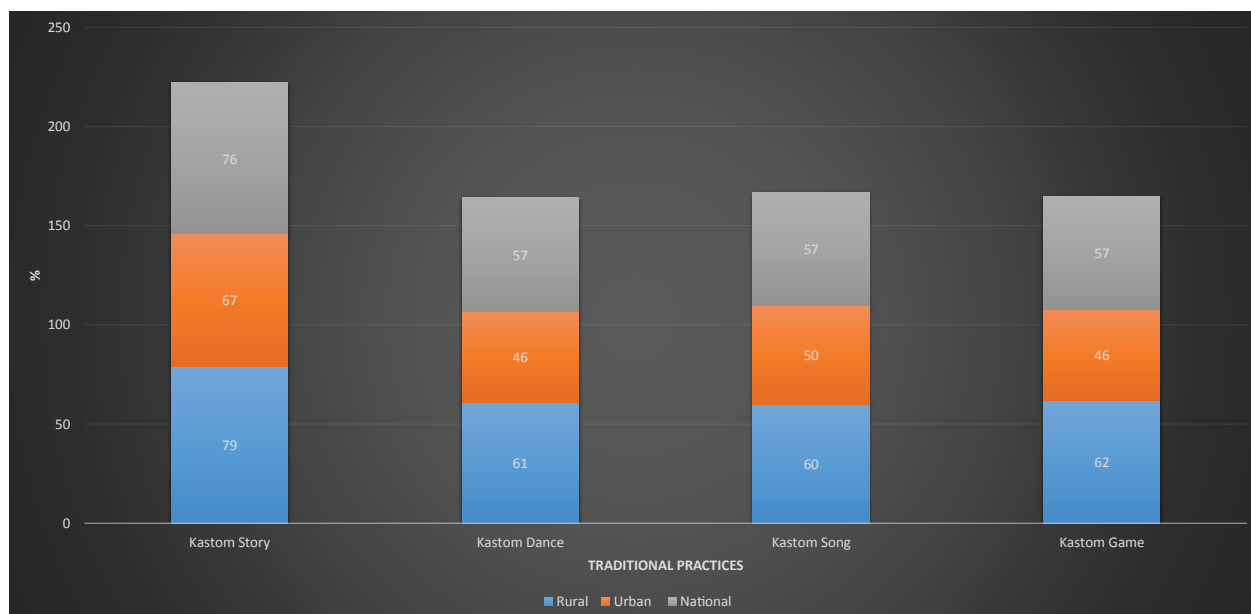


Figure 116: Knowledge of traditional stories, dances, songs and games, age 15+ and by area. (Vanuatu National Statistics Office 2021)

Figure 116 provides a summary on the percentage of the population (15 years age and older) that are able to perform a traditional story, dance, song or a game. Those residing in the rural areas consistently outperformed those in urban centres. About three quarters (76%) are able to recite at least one traditional story. Just over half (57%), are able to perform at least one traditional dance, sing at least one traditional song, and explain the rules of at least one traditional children's game (Figure 116 and Figure 117).



Figure 117: Traditional dancers from West Futuna Island. (Australia Govt. DFA).



Figure 118: Land diving at Pentecost Island. (Image source: Ben Smethers).

People living in the provinces of Tafea and Penama are more likely to have knowledge taught to them than those living in other parts of the country. These are areas where the population is still actively engaged in practicing ritual festivals that require communities coming together, singing, dancing and feasting. The communities in the south of

Pentecost Island continue to practice “Nagol”, or Land Diving, each year (Figure 118). Traditional leaders from Tanna Island bring their communities together for the Nikawiar festival. Both the Nagol and Nikawiar involve group dancing, singing and feasting, along with traditional stories that explain the purpose and objective of the festivals themes (Figure 119).



Figure 119: Traditional performers. (Image source: Ben Smethers)

People living in urban centres are challenged to use any traditional knowledge that may have passed on from their elders. As a result, the knowledge, including the language, is lost.

People living in Luganville and Malampa Provinces have less knowledge of their traditional songs, dances, and games. Unfortunately, many of the younger generation have lost the link to these traditional knowledge and assets. The people from the province of Tafea have the highest percentage of knowledge in one or more of the traditional stories, dances, songs or games than any other province. Of the younger generation from age 15 to 30 years, about 28% have no knowledge in traditional songs, dances, stories or games.

Knowledge of traditional lands and the natural environment is critical to understanding family history, and the places that are taboo and the reasons why. Not being exposed to the natural environment or understand some of the activities (e.g. when it is appropriate to plant or harvest crops) can be a challenge, as often seen by those that grow up in urban centres.

Impact

Any loss to traditional systems, including the language, contributes to the loss in traditional knowledge, wellbeing and identity of the country. The knowledge connects the people to their ancestors, society and to their environment. Vanuatu has been through some catastrophes in its history largely caused by outside influences, including diseases, forced labour, religion, colonial suppression, globalisation and climate change. Internal forces are also to blame, which include adoption of other cultures and languages.

Response

The Vanuatu Government has passed legislation in an effort to safeguard its culture and traditional knowledge. In 2019, it passed the Protection of Traditional Knowledge and Expressions of Culture Act. The legislation recognises the exclusive rights traditional owners hold in respect of all traditional knowledge. The legislation also ensures their consent is gained and they benefit from the use of their traditional knowledge associated with genetic resources. Another key part of the legislation is the setting up of an Authority that will assist with administering of the Act.

The Vanuatu National Cultural Council Act 2006 established the National Cultural Council Authority with the purpose of protecting cultural heritage and expressions of culture. This Council operates as a Competent Authority for protecting cultural heritage and expressions of culture. Its objects include to support, encourage and make provision for the preservation, protection and development of various aspects of the cultural heritage of Vanuatu.

The Copyright and Related Rights Act No 42 of 2000 of Vanuatu (Vanuatu Copyright Act) states it is an offence for

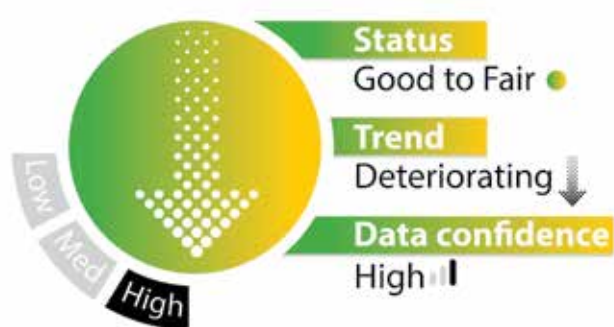
someone to reproduce, publish, perform and so on, any expression of Indigenous culture if they are not the 'custom owner' of that expression or authorised by the custom owners.

Vanuatu allows a significant input into protection and benefit sharing relating to traditional knowledge by representatives of its Indigenous Peoples. The involvement of the Council of Chiefs and the National Cultural Council along with the custom owners in the review process guards against both unscrupulous pharmaceutical companies and custom owners from benefiting from IKEC [Indigenous Knowledge and Expressions of Culture] at the expense of genuine custom owners (Martin et al. 2018).

Recommendations

- To support the engagement of the Council of Chiefs and the Vanuatu National Cultural Council to the safeguarding of Vanuatu's traditional knowledge, cultures and languages.

3.6.3 Traditional Productions



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 		SAMOA Pathway 78, 80, 81	NSDP – SOC 1; 2; 4; ECO 3

Indicator Definition

The people of Vanuatu have traditionally relied on their resources and their skills to survive and thrive on the islands. These skillsets and knowledge have been shared and passed down generations. Building a house using only local materials, requires knowledge in understanding the best timber that will withstand harsh tropical conditions, but also those that are resistant to termites and other critters. Weaving mats and making thatches for the roof, walls and floors require skills and knowledge. Securing food resources and preparing them safely for consumption is also important (see the State of food Production Indicator).

This indicator assesses the percentage of the nation that are able to weave mats, thatch roofs, carve wood or stone, and produce herbal medicines.

Status and Key Findings

As very similar to the Traditional Knowledge indicator, the majority of those with the traditional production skillsets are those living in rural areas.

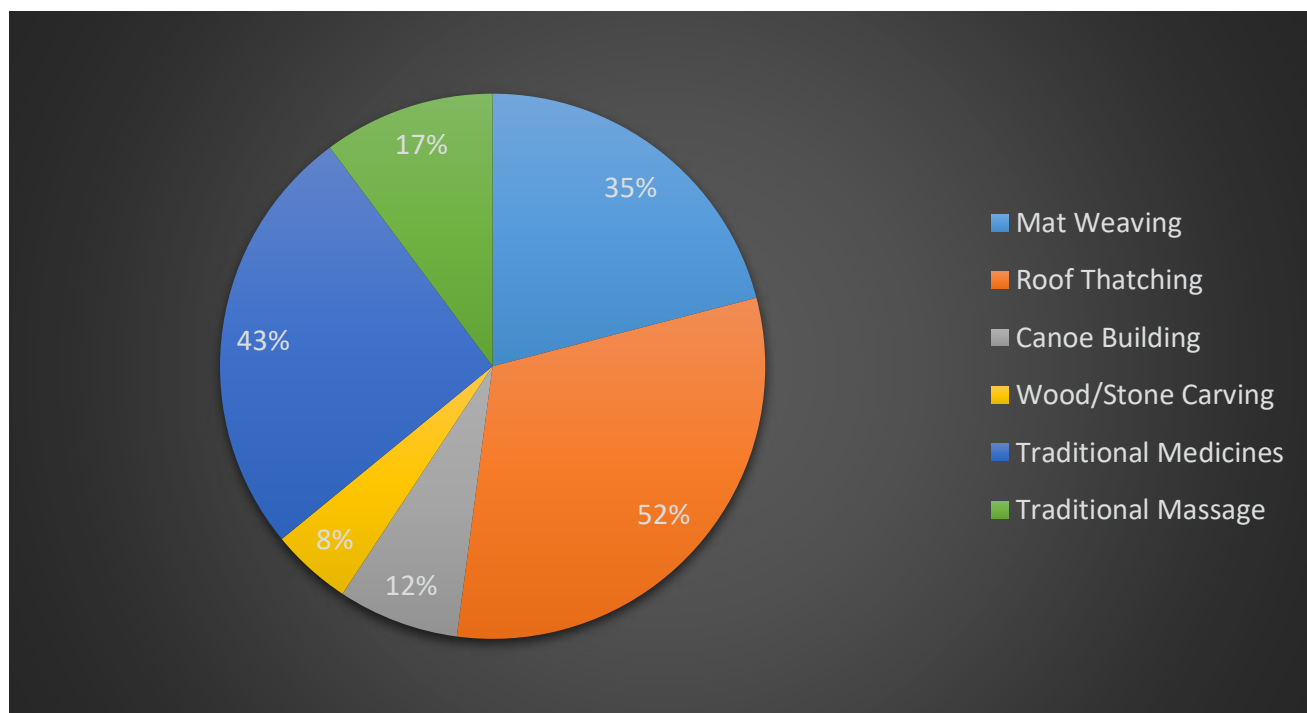


Figure 120: Traditional production skills, age 15+. (Vanuatu National Statistics Office 2021)

The 2010 pilot study on wellbeing in Vanuatu captures traditional production skills at the household level and offers an opportunity to see the change in skills over time. The proportion of households in possession of all the basic traditional production skills (identified in Figure 120) is reduced by 5% over the ten-year period. More than half, 56%, of all households have members possessing the basic production skills, including mat weaving, either roof or wall assembly, growing food, preparing roasted food for consumption, and either preparation of traditional leaf medicines or the skill of traditional massage. This is down from 61% of households with the same skills in 2010. Only 1% of households are without any of these basic skills that help keep a family healthy and safe.



Figure 121: Thatching roof materials is one of the key production skills. (Image source: Ben Smethers)

Shelter is necessary for protecting a family from the natural elements and it keeps people safe. Just over half, 52%, of people in Vanuatu ages 15 and over are able to assemble thatch roofing made from Natangura leaves (Sago Palm) or other local materials (Figure 121, Figure 122). More than half of all households in Vanuatu have members with the ability to produce and fasten thatch roofing, produce walls from local materials, weave mats, grow food crops, roast food for consumption, and produce traditional medicines or perform healing massages. More than two-thirds, 67%, of households in rural areas have all the basic production skills, compared to just 23% of urban households.

Traditional healing practices, such as massage, and the production of leaf or herbal medicines are ways in which people have lived long, productive and healthy lives in Melanesia. Many of these skills are passed down through the family, sometimes skipping a generation. Less than half, 43%, of people in Vanuatu ages 15 and over are able to produce some leaf medicine, and just 17% report an ability to perform traditional massage.

Households in the provinces of Penama, Tafea, and rural Sanma were more likely to possess all the basic production skills than households in other provinces.



Figure 122: ni-Vanuatu replacing a thatched roof on the chief's meeting hall.
(Rob Maccoll/AusAID CC-BY-2.0)

Very few households had members engaged in the production of handcrafts with the exception of woven goods, including mats, fans, baskets, hats, and other goods. Just less than one quarter, 24%, of households in Vanuatu have members actively engaged in the production of woven handcrafts—skills typically held by women. Only 14% of households with members engaged in production of woven handcrafts report their intention is to sell all the items produced. The majority of weavers, 78%, produce woven goods mostly or only for family use.

The vast majority, 93%, of households in Vanuatu have members participating in at least one traditional ceremony each year. Participation is relatively the same in rural and urban areas.

There are many people in Vanuatu with skills to carve, design, weave, sew, and more that have used them to provide income. These learned skills are gifts bestowed upon them by those that carried the knowledge before them. In some cases, such as with carving rights on the islands of Ambrym and Malekula, the right to carve particular designs is paid for by each carver. Weaving mats, baskets, fans and other items is the most common form of handicraft reported. Nearly one-quarter, 24%, of households in Vanuatu have members actively engaged in weaving handicrafts—31% in rural areas and just 5% in urban areas.

Impact

Basic production skills are more universally held in rural areas, however, and individuals in households with all five are slightly better off. This may change as housing materials move from renewable natural resources—bamboo, wild cane, thatch panels, local timber—to those that require modern construction skills as currently trending. It may also change as food sources move from home produced, seasonal, organic and healthy foods to those that are heavily processed and sold in stores. As these basic traditional skills are lost, people become more dependent on the cash economy. People that are less successful in the cash economy may be forced to live in housing that is less safe and to eat foods that are less healthy.

Response

Vanuatu has made a national commitment towards the preservation of its national heritage through the protection of cultures, cultural artefacts, traditional knowledge and languages. Legislation has been passed to protect these national treasures, including:

- The National Cultural Council Act,
- National Language Council Act,
- Intellectual Property Organisation Copyright Treat Act,
- Intellectual Property Organisation Performances and Phonograms Act,
- Convention for the safeguarding of the intangible Cultural Heritage Act,
- Treaty on Plant Genetic Resources for Food and Agriculture Act, and
- The Protection of Traditional Knowledge and Expressions of Culture Act.
- Traditional Knowledge Strategic Plan

The Vanuatu Kaljoral Senta was established as a statutory body to preserve, protect, develop and promote Vanuatu's rich and diverse cultural heritage. Some of its key responsibilities include the collection, storing and dissemination of information on the country's cultural heritage. The VKS has been documenting historical events, oral traditions, traditional knowledge and artefacts. Surveying of cultural and historical sites are also important part of VKS's work.

Recommendations

- Continue to support the efforts by communities and the government in the promotion, protection and preservation of all Vanuatu's natural heritage.
- Develop policies to safeguard knowledge and practices on traditional productions and ensure sufficient resources are secured to implement these policies.

3.6.4 Food Production and Consumption



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS		 		SAMOA PATHWAY 6, 60, 63(G), 68, 69, 72	NSDP – SOC 1; 2; 4; ENV 1; 4; SOC 3

Indicator Definition

The percentage of Vanuatu households that are engaged in production of food crops for home consumption.

Status and Key Findings

Food production and preparation are the basic skills that sustains families and communities. The National Sustainable Development Plan survey (2019-2020) found 83% of households are engaged in production of food crops for home consumption (VNSO 2021). The percentage of those residing in rural areas was higher at 97% compared to those in urban centres (42%) (VNSO 2021). Those living in Luganville were more engaged in food crop production (65%) than Port Vila residents (36%). About 76% of the food crop farming is on customary lands, whereas 75% of urban households farm on leased lands. Food security affects 5.7% of the population,

which is slightly higher in rural areas (7.6%) compared to urban centres (0.3%). The majority of ni-Vanuatu (88%) that are aged 15 years and over, have gardening skills and are able to grow food crops (Figure 124). Cooking or roasting food on a fire is a skill that is performed by 87% of Vanuatu (Figure 124).

The making of Vanuatu's traditional dish the Laplap takes effort and skills. A good proportion of the population (70%) is able to make Laplap (Figure 123, Figure 124).



Figure 123: The making of Vanuatu's traditional dish
(Australian Government. Department of Foreign Affairs)

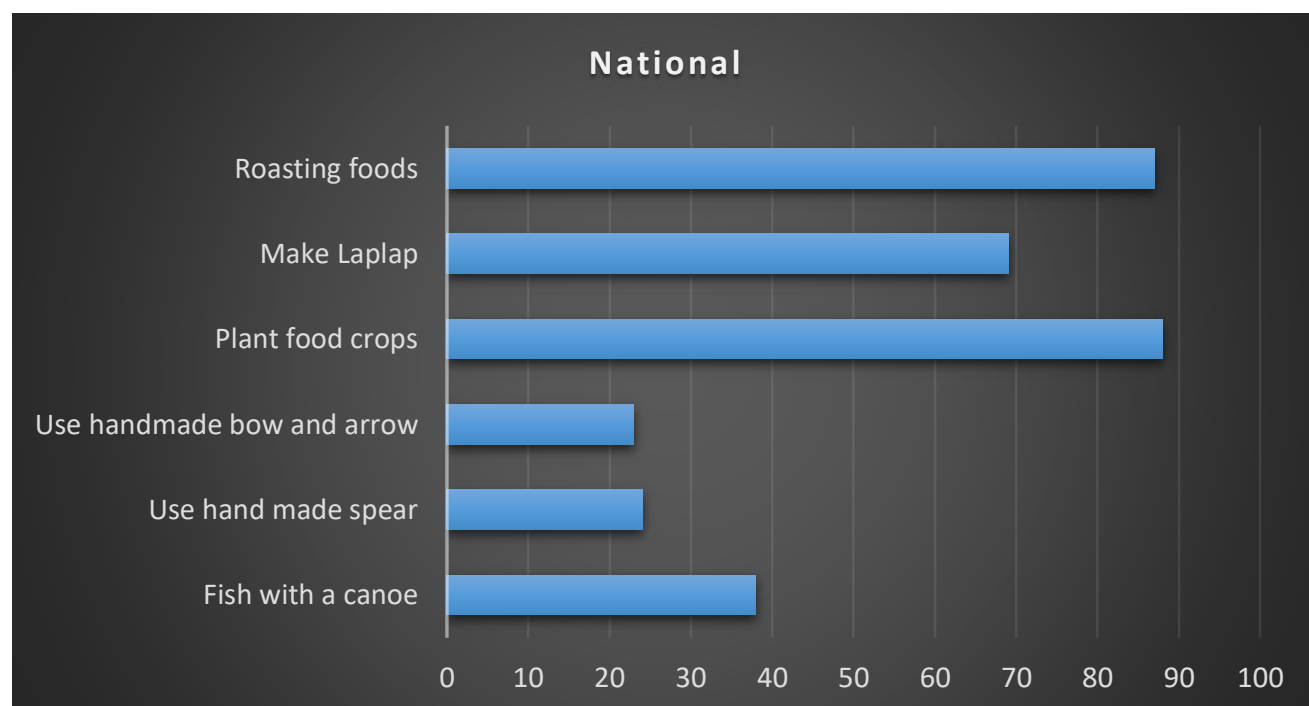


Figure 124: Traditional food production skills, age 15+. (VNSO 2021)

The ability to use a spear or a bow-and-arrow has declined to under 40%, which is a concern, as these are part of Vanuatu's national assets. Traditional eating habits are based on what is available at the time. There is no set breakfast, lunch and dinner, but eating usually takes place when someone is hungry. Coconut cream is used prolifically in the preparation of food. The diets for ni-Vanuatu residing in urban centres, and to some extent those in peri-urban centres, have changed considerably to more shop-bought processed goods, such as rice, 2-minute noodles, canned tuna, bread, rolls and biscuits.

In 2009, the country held a National Food Summit, which was followed up with a Pacific Food Summit in 2010 (Hill 2013). The main concern was the change in consumption patterns in Vanuatu from fresh local foods to imported, manufactured and processed foods (Abel 2009). This change along with the decline in physical activities has led to Pacific island countries having some of the highest rates of obesity and non-communicable diseases in the world (Abel 2009). This sadly accounts for three-quarters of all deaths in the Pacific due to non-communicable diseases.

In Vanuatu, cases of diabetes and high blood pressure are increasing fast. Diabetes grew from 112 (per thousand) in 1995 to 163 in 1996 and 247 in 1997 (Vanuatu Ministry of Health 2012; Hill 2013). Most of the non-communicable diseases were prevalent in urban centres compared with rural areas (Taylor et al. 1991).

Malnutrition and hunger is also an issue in Vanuatu. Iodine and Vitamin A deficiency are a significant public health concern. Those living in urban squatter settlements and peri-urban areas are most vulnerable to micronutrient deficiencies (Welegtabit 2001). These areas are increasingly embracing a lifestyle dependent on imported and processed food products, while are often not able to afford adequate proteins and vitamins needed to properly supplement their imported food diets (Hill 2013). Locally produced foods are often overlooked.

Impact

As more rural residents move to urban centres and adopt non-traditional lifestyle changes, such as purchasing food, and goods for building homes, the repercussions in the loss of traditional knowledge and on food production can be profound. Immediate impacts may include being susceptible to non-communicable illnesses. The more serious and long-term implication is the loss of the knowledge and connection to the foundation that has sustained ni-Vanuatu communities over thousands of years. Not being able to pass this knowledge down generations will be catastrophic to the identity of the country.

The easy access and the popularity of processed imported goods ensure that they are easily adopted and preferred by remote and rural communities. This is especially if the goods last several days to weeks and months. This has potential implications where farming is considered less attractive, and the preparation of traditional food declines. There is an unfortunate decline in agriculture production, which may be linked to market demand and land security issues. This needs to be a priority for the Government and the communities to resolve.

Response

Food security is an issue of concern for the country. A first plan of action for the country's food and nutrition was released in the late 1990s, under the umbrella of the Ministry of Health. Under the National Sustainable Development Strategy, food and nutritional security is one of the critical areas under the Environment Pillar. It recognises that the state of natural environment is critical to Vanuatu's food needs. Furthermore, the NSDS highlights the importance of traditional knowledge in relation to food production and preservation, as part of the country's response to climate change. The Vanuatu Cultural Centre has implemented a 'slow food programme' on some islands for the past few years, which aimed at promoting and preserving the traditional methods of food preparation.

Recommendations

- With the rise in non-communicable diseases (NCD) in Vanuatu, a national plan needs to be considered to assist with addressing this health challenge. This may include ensuring affordable wholesome food for the local population, regulating processed food and setting health and safety standards for food products. Promoting the go-local concept, where locally produced foods are marketed as better products than imported goods.
- The collection of data on fresh produce being sold should be considered and included under the umbrella of the Ministry of Agriculture, Quarantine, Forestry and Fisheries.
- Ensuring that ni-Vanuatu people continue to have access to land to allow them to be productive and grow food.
- Promote and encourage community networks that focus on training the gardening and farming of food crops, such as the local food basket programme being implemented in the six provinces.

3.6.5 Sites of National Significance



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS				SAMOA PATHWAY 6, 60, 63(G), 68, 69	NSDP – SOC 1; 2; 4; ENV 5; ECO 2

Indicator definition

Sites of national significance can include important areas of biodiversity. The indicator assesses the state of sites of national significance in particular the number of sites being registered and their management.

Over 2000 sites have been surveyed by the VKS and these are documented. One of the important historical sites is the Chief Roi Mata Domain, which is now a UNESCO World Heritage Site (Figure 125).

Key Findings

Vanuatu has developed a historical site classification system.

- Cultural sites – Pre-European contact sites whose stories are still told around the fire and being passed on e.g. Old Nasaras, villages, grave, etc.
- Historical sites – European contact sites are those that may have European influence. Most of these sites would have European artefacts, such as ceramic pots, iron tools, limestone plaster, mission churches and houses.
- Archaeological sites are Pre-European, Pre-cultural sites. These may not have any traditional knowledge associated with them, but contain evidence of historical settlements such as a Lapita pottery, artefacts, or burial sites (skeletal remains) whose story is lost.
- World War II wreckage sites. These sites include the President's Coolidge in Espiritu Santo dive site, which is a well-known tourism site. The designation of this site under the National Heritage Listing encourages its protection including the marine area surrounding the wreck.

Chief Roi Mata World Heritage Site

Chief Roi Mata's Domain, the first site to be inscribed in Vanuatu, consists of three early 17th Century AD sites on the islands of Efate, Lelepa and Artok associated with the life and death of the last paramount chief, or Roi Mata. The property includes Roi Mata's residence, the site of his death and Roi Mata's mass burial site. It is closely associated with the oral traditions surrounding the chief and the moral values he espoused. The site reflects the convergence between oral tradition and archaeology and bears witness to the persistence of Roi Mata's social reforms and conflict resolution, still relevant to the people of the region.

Chief Roi Mata's domain is considered to have Outstanding Universal Value of a landscape representative of Pacific chiefly systems. This is reflected in the interaction of people with their environment over time in respecting the tangible remains associated with Roi Mata and being guided by the spiritual and moral legacy of his social reforms. The landscape reflects continuing Pacific chiefly systems and respect for this authority through tabu prohibitions on use of Roi Mata's residence and burial that have been observed for over 400 years and structured the local landscape and social practices.



Figure 125: Chief Roi Mata's Domain (Phillip Capper CC-BY-2)

The landscape memorialises the deeds of Roi Mata who still lives for many people in contemporary Vanuatu as a source of power and inspiration.

The site is protected through traditional management under the chiefly system and tabu prohibitions and government legislation. The management system involves the local community and government administrative bodies.

Impact

The lack of recognition on some of the significant sites can lead to destruction of heritage, thereby contributing to the erosion in cultural knowledge and value. The erosion of traditional customs and the rapid uptake of outside values are partly contributing to the loss of understanding and valuing of historical sites. Severe weather phenomena attributed to global warming are a key threat to these sites.

Response

The work in identifying and registering historical sites falls under the Vanuatu National Heritage Registry section of the Vanuatu Cultural Centre. The key legislations that provide support to the historical sites work are the Vanuatu National Cultural Council Act, the Preservations of Sites and Artefacts Act (CAP 184), the Land Reform Act and the Department of Conservation Protection and Act.

The National Heritage Registry has developed a process to assist with identifying important sites through awareness raising with communities. Communities are engaged by assisting with surveying of potential historical sites, and staff from the Vanuatu Kaljoral Senta facilitated and recorded the process. These sites are then registered under the National Heritage Listing.

Recommendations

- The threats posed by climate change on Vanuatu's environment are significant so that some urgency is required to ensure that sites of national importance, are surveyed, and documented. Therefore, the work of the National Heritage Registry section needs to be supported and resources provided to facilitate this process.
- Strengthening and empowering communities to identify important cultural sites and put in place tabu and other traditional management systems should be a national priority.
- Support the implementation of existing legislation, to strengthen the efforts of communities in the preservation of their sites.
- Develop guidelines or best practice on how some of the sites should be managed, as well as identifying those that could be used for the tourism sector.

Culture and Heritage References

- Abel, M. 2009. National Food Summit – A Dialogue between the Vanuatu Government Ministries, UN & Regional Agencies, Food Producers and Traders. Port Vila.
- Crowley, T. 1997. What happened to Erromango's languages? *Journal of the Polynesian Society* 106, 33–63.
- Crowley, T. 2000. The language situation in Vanuatu. *Current Issues in Language Planning* 1, 47–132.
- François, A. 2012. The dynamics of linguistic diversity: Egalitarian multilingualism and power imbalance among northern Vanuatu languages. *International Journal of the Sociology of Language* 214, 85–110.
- François, A., Franjeh, M., Lacrampe, S., Schnell, S. 2015. The exceptional linguistic density of Vanuatu, in François, A. et al. (Eds). *The Languages of Vanuatu: Unity and Diversity, Studies in the Languages of Island Melanesia*, Canberra: Asia Pacific Linguistics.
- Hill, DR. 2013. Food Security and Land Disputes in Vanuatu's Peri-Urban Neighbourhoods – An Exploration of Linkages. Ottawa, Ontario.
- Lynch, J. Crowley, T. 2001. Languages of Vanuatu: A new survey and bibliography. *Pacific Linguistics*, The Australian National University. PL-517, xiv + 187 pages. 2001. DOI:10.15144/PL-517.cover.
- Martin, F., Cahill, A., Wright, E., & Stoianoff, N. 2018. An international approach to establishing a Competent Authority to manage and protect traditional knowledge. *Alternative Law Journal* 44(1): 48-55.
- Taylor, R., Jalaludin, B., Levy, S., Montaville, B., Gee, K., & Sladden, T. 1991. Prevalence of diabetes, hypertension and obesity at different levels of urbanisation in Vanuatu. *The Medical Journal of Australia* 155 (2): 86-90.
- Tryon, D. Language, Space and Identity in Vanuatu.
- Vandeputte-Tavo, L. 2014. D'une véhiculaire à une identitaire. Trajectoire du au Vanuatu (Mélanésie). Doctoral thesis in social anthropology, EHESS, Paris.
- Vanuatu National Statistics Office. 2021. Well-Being in Vanuatu. 2019-2020 NSDP Baseline Survey. Port Vila, Vanuatu. 179 p.
- Vari-Bogiri, H. 2008. Safeguarding endangered languages. Vanuatu – a case study. Presented at the UNESCO/UNU Conference on Globalization and Languages. University of the South Pacific.
- Welegtabit, S.R. 2001. Food Security Strategies for Vanuatu. Working Paper Series, The CGPRT Centre.
- All Answers Ltd. (November 2018). Traditional Knowledge and Environmental Change in Vanuatu. Retrieved from <https://ukdiss.com/examples/traditional-knowledge-environmental-change-vanuatu.php?vref=1>.

THEME 7:

ENVIRONMENTAL GOVERNANCE

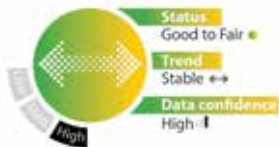
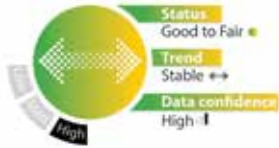


Image source: DEPC

Environmental Governance Overview and Highlights

Governing Vanuatu's rich and diverse natural resources is an increasing challenge, given the complexity of issues such as the demand for goods from a growing population, the land tenure system, and the impacts attributed to climate change that bring about severe weather conditions. Managing the threats to Vanuatu's environment will require a suite of tools and innovative governance and management systems that are adaptable to dealing with these drivers of environmental change. Effective governance, which includes the laws, standards, guidelines, practices, policies and institutions that manage the interactions between people and the environment, is critical. Under the Vanuatu's National Environment Policy and Implementation Plan 2016-2030 (Vanuatu Government 2017), Environmental Governance and Capacity Development is one of the key objectives. The aim is to review institutions, legislation and coordination and put in place measures to ensure efficiency and good management practices in the environment sector. This State of the Environment Report is one of the key activities of the Policy. There are four indicators being used for assessing the theme.

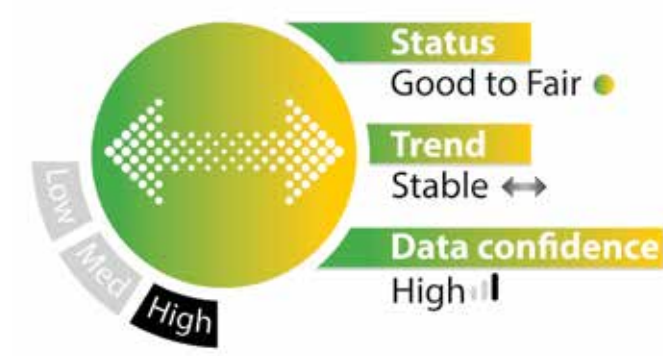
- Multilateral Environmental Reporting
- Approved Development Permits
- Compliance and Prosecutions
- Ministry's Environmental Budget Allocation

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE
Multilateral environmental reporting		Vanuatu is a member of 23 MEAs with focal points mostly at DEPC (57%) and some in other Government ministries. Of the key biodiversity MEAs Vanuatu has been able to submit over half of its reports Challenges in some areas due to lack of resources and staff and the regularity of reports are causing a 'reporting fatigue'	Recognising the reporting fatigue and working with other PICs and MEAs to streamline the reporting processes Recommendations Strengthen national capacity and secure resources to assist with Vanuatu's reporting obligations
EIAs approved development permits		From 2015 to 2020 nearly 500 applications for EIA permits were received. Majority of proposals involved resource mining in the three islands Efate, Santos and Tanna. Two-thirds of proposals are approved with some conditions, the rest pending. Consultants are registered to undertake EIA assessment and review.	EIA legislation has been developed and the application process is available online. Recommendations Capacity building and recruitment of officers to assist with understanding and enforcement of the EIA process and legislation. Ensure financial resources are secured to allow the government to meet its obligations required under the EIA law.

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE
Compliance and prosecutions	 The infographic features a circular arrow graphic with a color gradient from yellow to red. To its right, three horizontal bars provide key metrics: 'Status' is 'Fair to Poor' with a red arrow pointing right; 'Trend' is 'Stable' with a yellow double-headed arrow; and 'Data confidence' is 'Medium' with a grey bar and a small icon.	Compliance, monitoring and enforcement units have been part of many Government ministries. DEPC's compliance and monitoring team is relatively new. Compliance, monitoring and enforcement have been key provisions of the environmental legislation, which has been passed to support the work by the Department of Environment. Community awareness on the role of the Department of Environment has contributed to closer working relationships with various communities leading to better protection of the environment from project developments. Responding to communities' complaints is part of the Compliance work. Currently, there is no prosecution due to non-compliance.	National legislation for sectors have been developed that enforces penalties for non-compliance. Recommendations Strengthen compliance, monitoring and enforcement capacity at all levels. Secure funding to support the enforcement and compliance activities. Develop guidelines and checklists for effective monitoring. Integrate sound environmental practices into the management and operations of companies, industries and institutions.

TOPIC	STATUS AND TREND	KEY FINDINGS	RESPONSE
Environmental funding commitment		The importance of the environmental sector continues to grow within the government and the community. Funding from the Government to the Ministry continues to increase, although not at the same increments as other ministries. Funding allocation to the environment sector from within the Ministry of Climate Change budget remains at 10-12%. Some positions under the Department of Environment remain vacant.	The National Sustainable Development Plan 2016-2030 identifies Environment as one of the key pillars in realising the national vision. To realise this vision, the environmental sector requires commitment through adequate resources and funding. Recommendations Continue to advocate for more funding for the environment sector from the government and development partners. Demonstrate the value of biodiversity to the national economy. Explore more revenue incentives through the development of policy directives to protect Vanuatu's natural resources. Develop project proposals to seek funding from Global Environment Facility, Adaptation Funds, UNEP, Green Climate Fund, and other environmental funding sources.

3.7.1 Multilateral Environmental Agreements



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	SGD11	Rio Declaration on Environment and Development	SAMOA pathway NOUMEA CONVENTION	ENV 2.5

Indicator Definition

Multilateral Environmental Agreements (MEAs) are regional or international agreements amongst the various countries to collaborate on a range of issues. While many take the form of 'soft-law', some countries have implemented national legislation to make these issues legally binding. Regular reporting to MEA Secretariats is part of countries obligations. The challenge is that for the majority of small island countries, the same person may be responsible for providing the report to various MEAs. This can lead to repetition, reporting fatigue, lack of reporting, and having no time to implement some of their responsibilities to the country. The ability of Vanuatu to fulfil its reporting obligations to MEAs that they are party to, provides an indication of how well the environmental sector operates.

Status and Key Findings

Vanuatu has signed and ratified 23 MEAs (ANNEX 2 – MEAs Reporting). The DEPC is the national focal point for 13 of the MEAs, with the rest shared amongst other government agencies (e.g. Vanuatu Fisheries Department, Department of Forests and the Department of Climate Change, and others) (see Figure 126).

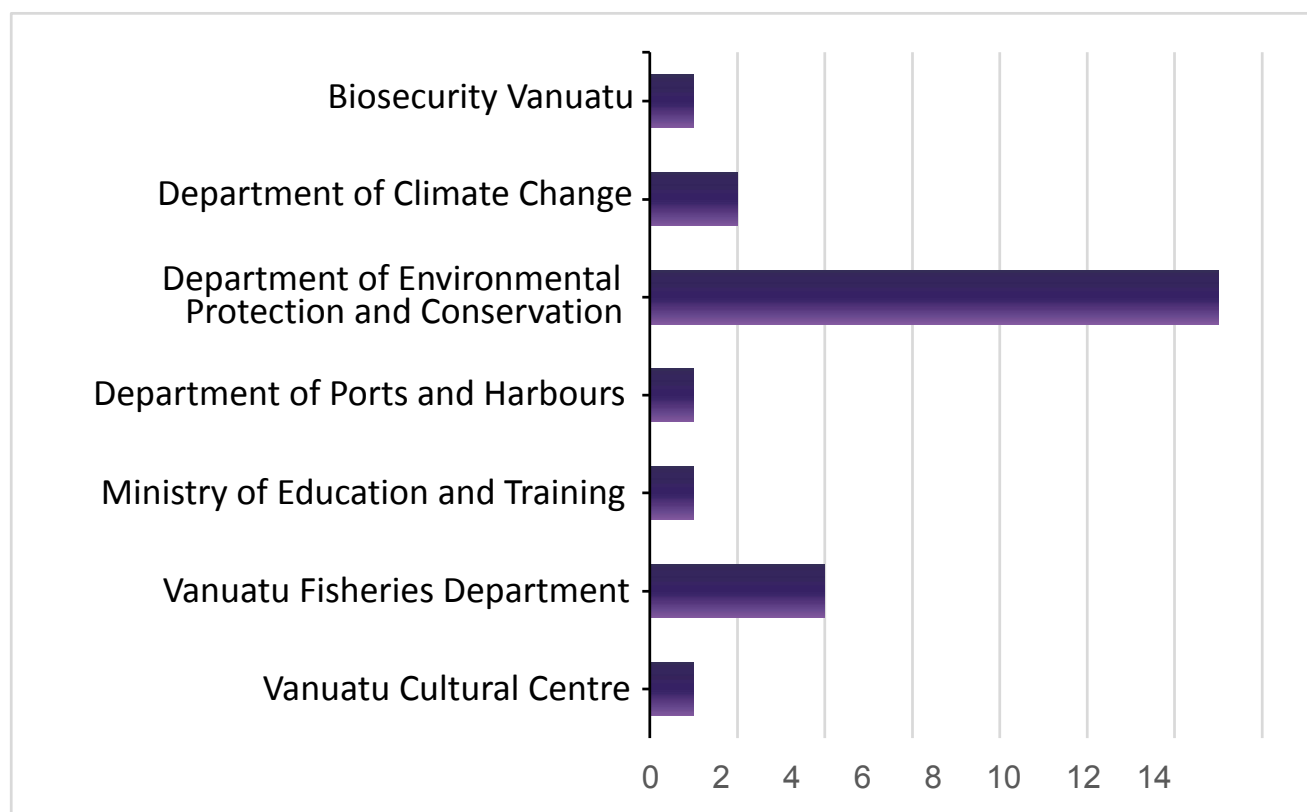


Figure 126: Vanuatu's reporting break-down to the main MEAs. (DEPC)

Convention on Biological Diversity

Vanuatu became a member in 1993. National Focal Point for CBD is the DEPC and the Department of Foreign Affairs. Vanuatu's reports to the CBD can be found via <https://www.cbd.int>. The Government has submitted the following reports:

- First National Report was submitted on 2 February 1998
- Second National Report submitted on 3 October 2002
- Third National Report submitted on 8 February 2007
- Fourth National Report (not submitted)
- Fifth National Report was submitted on 08 August 2014
- Sixth National Report was submitted in 2019.
- National Biodiversity Strategy and Action Plan (revised) submitted 25 June 2018
- National Biodiversity Strategy and Action Plan submitted 26 March 2002

The fourth national report was not submitted.

Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)

Vanuatu became a member in 1989. The management authority is the Department of Environmental Protection and Conservation, whereas the Department of Fisheries and the Department of Forestry provide the Scientific Authorities. As a member of CITES, Vanuatu is required to submit an annual report on its CITES trade. The report should contain a summary of information, the number and type of permits and certificates granted, the countries with which it trades with, the quantities and types of specimens and the names of species as included in CITES Appendices I, II and III. Failure to submit an annual report for three consecutive years without providing adequate justification could lead to the Standing Committee recommending to all Parties to suspend trade with the Party concerned. Vanuatu has provided annual trade reports from 2017, 2019 and 2020 (www.cites.org).

- Convention on the Conservation of Migratory Species of Wild Animals (CMS),

Vanuatu participates as a non-party member, having signed on to a few MOUs of the Convention. The main MOUs for Vanuatu are:

- Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (signed in 2010)
- Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (signed in 2006)
- Memorandum of Understanding on the Conservation of Migratory Sharks (signed in 2013)

There are no reports expected of Vanuatu due to its non-party status.

- Convention concerning the Protection of the World Cultural and Natural Heritage (UNESCO).

Vanuatu became a member of UNESCO following the ratification of the Convention on 13 June 2002. It currently has one World Heritage Listed site – Chief Roi Mata's Domain. Vanuatu is required to provide Periodic Reporting as an essential process for the implementation of the World Heritage Convention. The first cycle of Periodic Reporting for Vanuatu (as part of the Asia and the Pacific Region) was in 2003, which led to the inscribing of the Chief Roi Mata's Domain. The second Period Reporting was scheduled is 2012 (UNESCO 2012).

Vanuatu has been able to submit just over half of its reporting obligation to the MEA Secretariats on time (Figure 127). Nine full country reports were submitted, whereas three reports were partial, or require a resubmission (Figure 127).

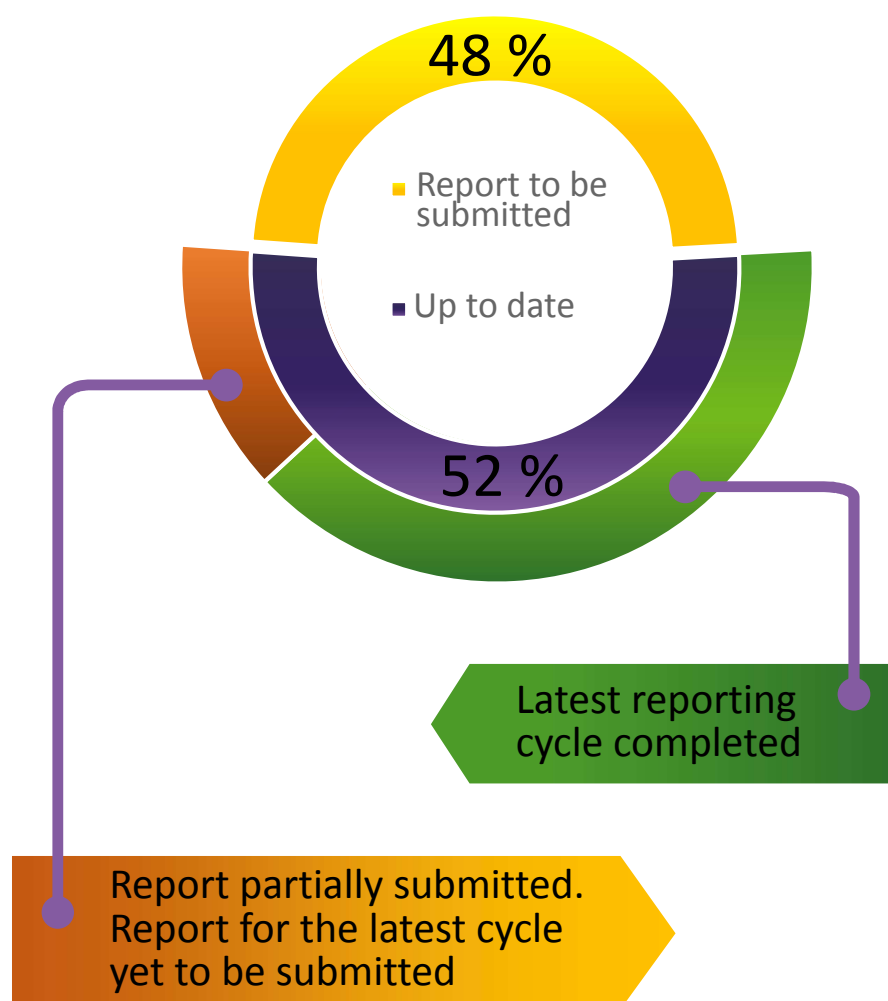


Figure 127: Vanuatu's latest MEA reporting status

Impact

The MEAs reporting provides an opportunity for each member to update others on progress made since the last reporting cycle. Many island nations including Vanuatu have recognised that while the intention of regular reporting is good, the implementation reality is becoming onerous for many. This is attributed to limited resources within countries, the regularity and frequency of reporting and the time factor in drafting reports that often falls on the same individual to report on the many different MEAs.

Most of the obligated reporting burdens lie with the DEPC due to its legislated functional responsibilities. However, the department at this time of SOE reporting, is currently understaffed and under capacity to efficiently implement some actions of these MEAs in particular the periodic reporting obligations for the international community to be aware of the country's inputs to addressing pressing global and local environmental issues.

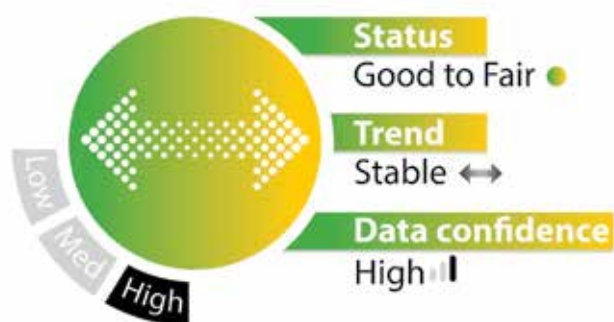
Response

The Government recognises a reporting fatigue and the difficulty in meeting some of the deadlines proposed by the various MEAs. There is a concerted effort especially by the CROP agencies to assist countries streamline the reporting format and requirement.

Recommendations

- Vanuatu to continue to advocate each of the MEA secretariats for more assistance in the preparation of regular reports.
- Vanuatu to work closely with other Pacific island countries to raise awareness on the challenges of MEA reporting within the regional framework, such as through the CROP agencies.
- Identify the support that is needed by national focal points and provide the necessary resources to ensure that they are able to meet Vanuatu's obligations under each MEAs.
- Where possible engage local expertise and consultants to work with departments in the preparation of MEA reports.

3.7.2 Environmental Impact Assessments



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	 11.4, 11.6, 11.a, 11.b, 12.2, 12.b	Noumea Convention Rio Declaration	SAMOA Pathway	

Indicator Definition

There is an assumption that many of the past development projects around Vanuatu have been undertaken with little to no consideration on their impacts to the environment. Since the Environmental Management and Conservation Act came into effect in 2002 with amendments in 2010, 2016 and 2019 (now known as the Environmental Protection and Conservation Act), three key environmental instruments have been passed that are important to all projects and developments in the country. The establishment of the Department of Environmental Protection and Conservation; legislating of environmental impact assessment for all projects; and the recognition of community conservation areas, are the three key parts of the Environmental Protection and Conservation Act. This indicator assesses the implementation of the Environmental Impact Assessment component of the Department of Environmental Protection and Conservation.

Status and Findings

The number of applications from 2015 to 2020 is 470, or an average of 89 per year (Figure 128). The number of applications was highest in 2019 with 141 received. Of the applications received from 2015 to 2020, approval was granted to 375 applications with conditions, and 160 pending approval (Figure 129). The majority of applications were for resource mining with over 150 applications (Figure 130).

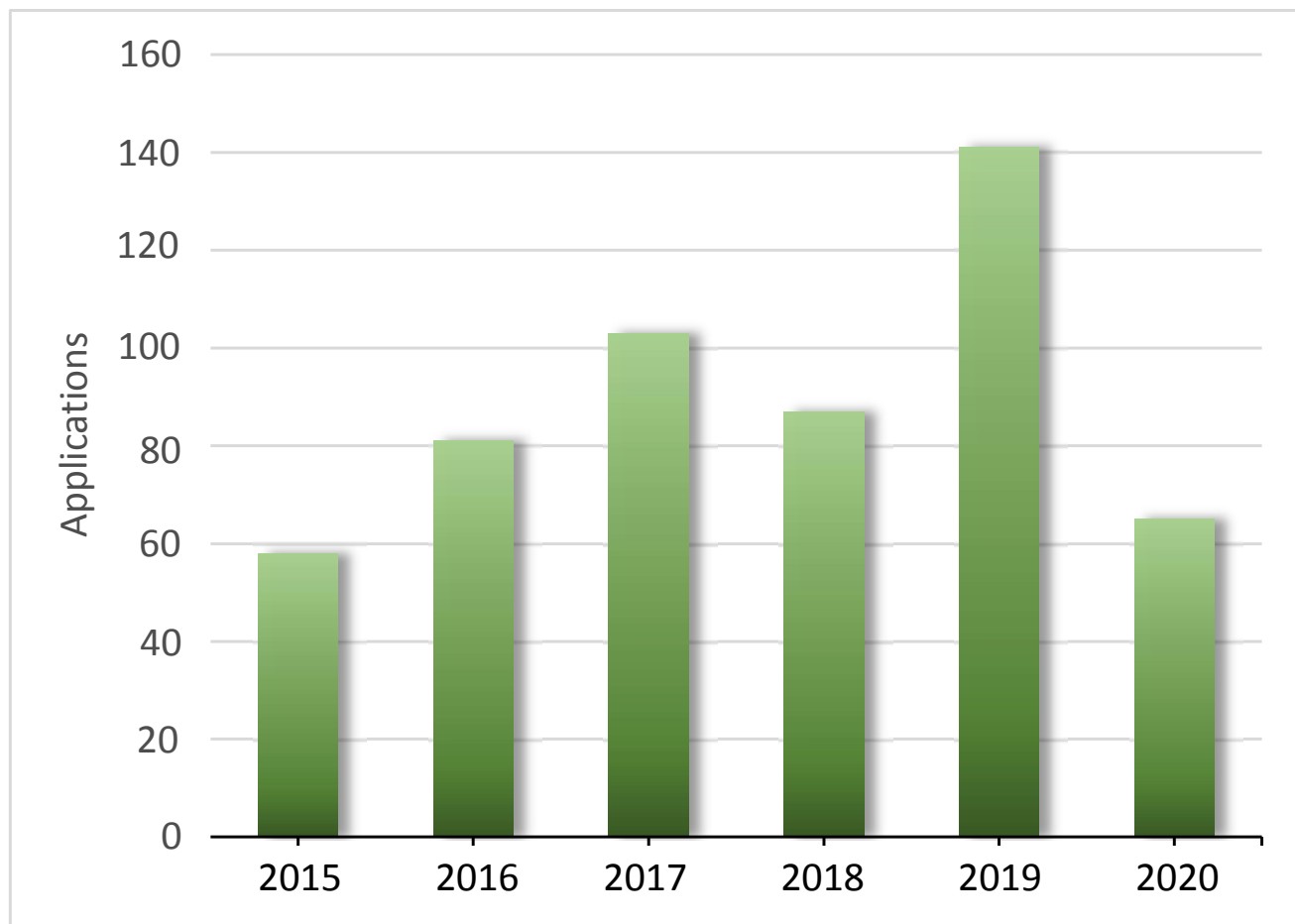


Figure 128: Number of applications for EIA from 2015 to 2020. (DEPC)

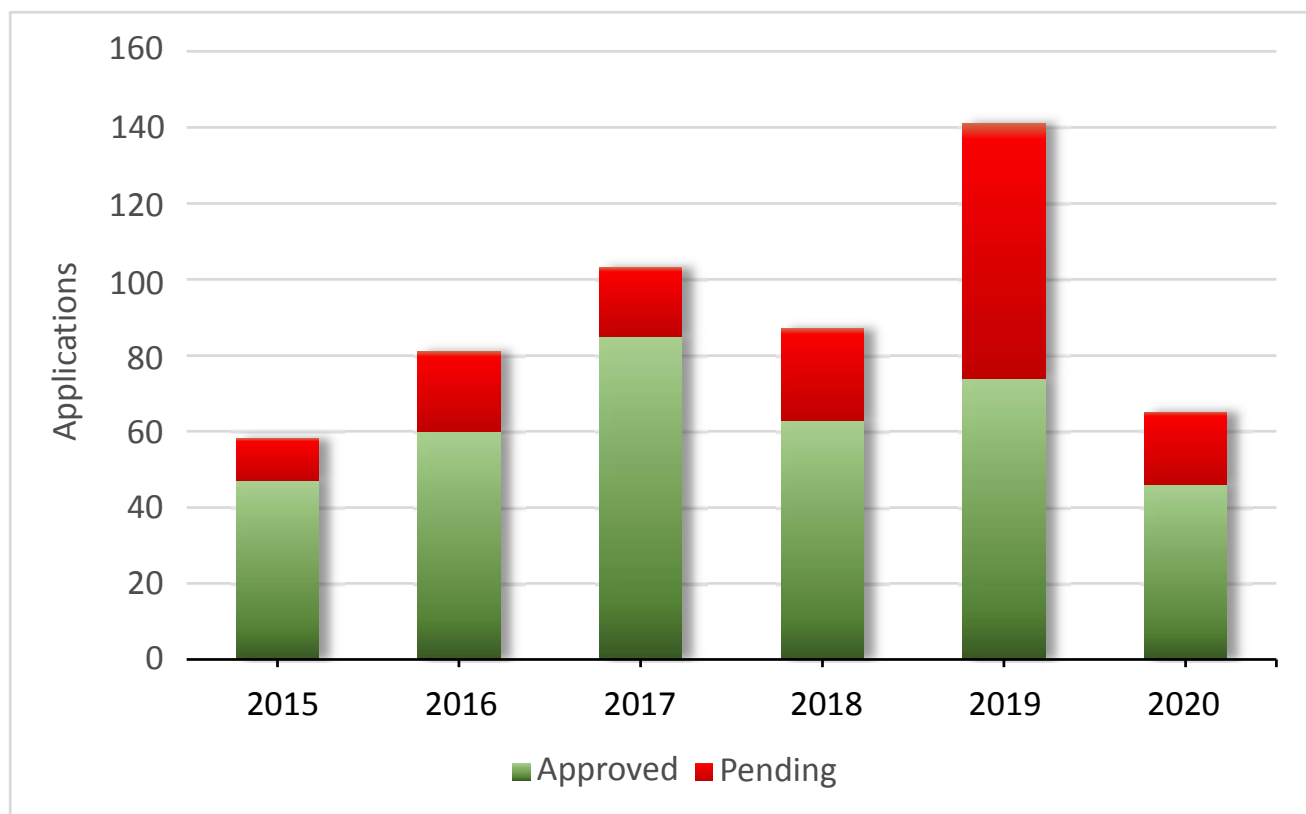


Figure 129: Applications were either approved with conditions or pending approval. (DEPC)

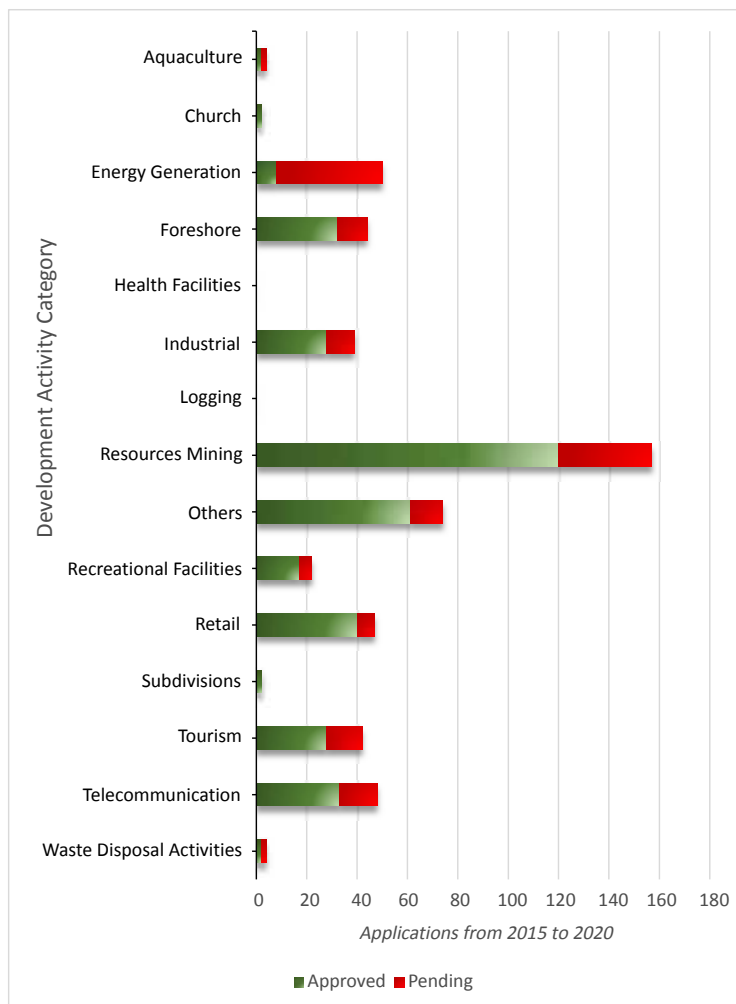


Figure 130: Categorising the various applications for EIA approval. (DEPC)

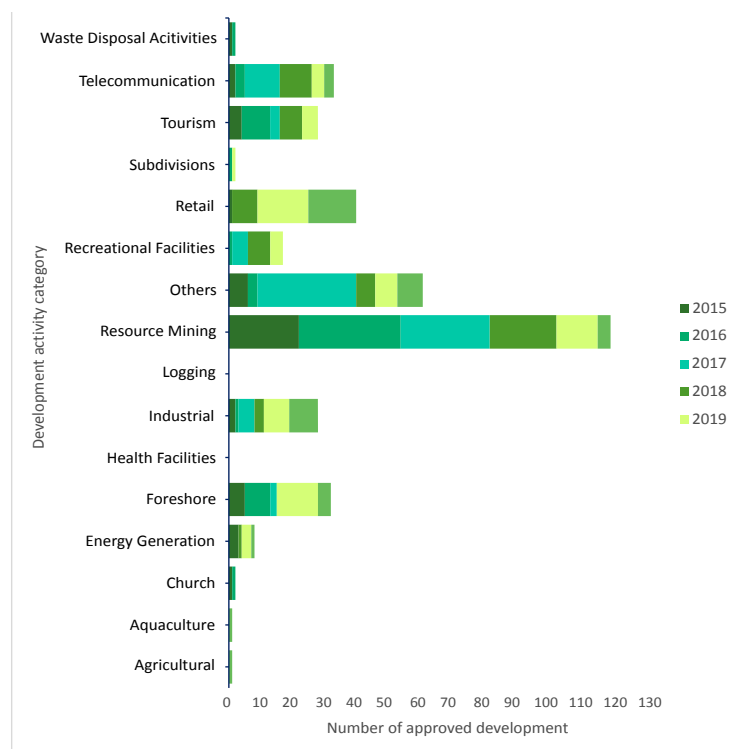


Figure 131: Approved projects by category from 2015 to 2020. (DEPC).

The majority of the applications were received from the three main islands of Efate, Tanna and Santo (Figure 132). Applications were also assessed for projects in the outer islands (Figure 133).

Development projects on the three main islands from 2010 - 2020

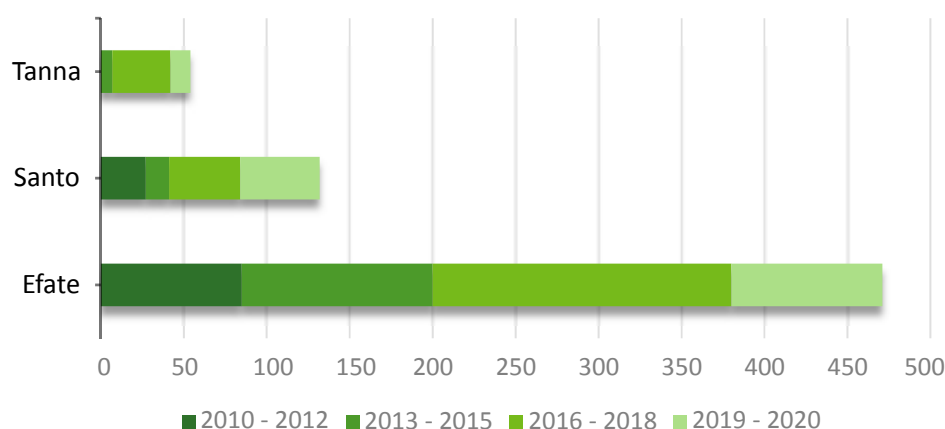


Figure 132: Applications were received from the three main islands. (DEPC)

Development projects on other islands from 2010 - 2020

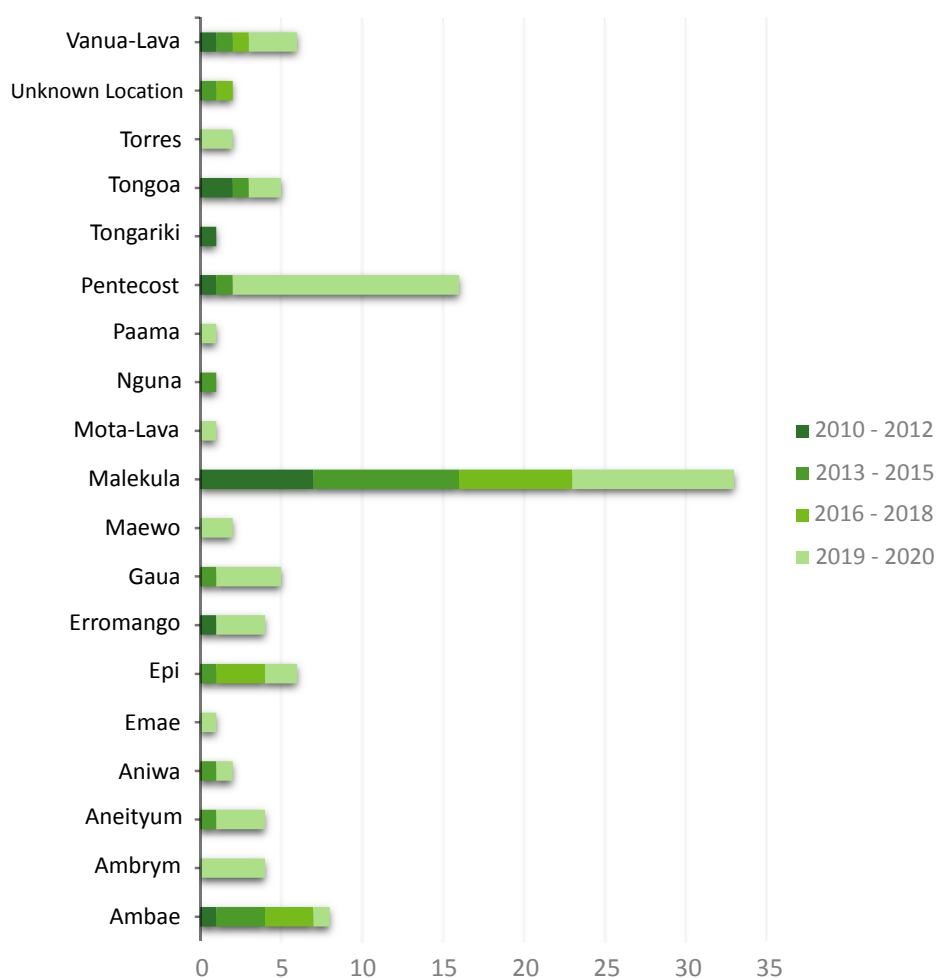


Figure 133: Applications for an EIA were received from outer islands. (DEPC)

Most of the approved projects received (Figure 133) were for mining (quarry activities) to be used either in the aggregate industry, landscaping, for commercial use and for the Public Works Department (Table 41). Almost half (48%) of the applications were from Efate (Table 42).

Table 41: Permit applications for resource extraction by various sectors. (DEPC)

TYPES OF PERMIT	TOTAL	%
Aggregate Prospecting	6	2
Landscaping	10	3
Occasional	124	39
Commercial	72	23
PWD	106	33
Total	318	

Table 42: Locations where applications for resource mining were applied for. (DEPC)

	Type of Permits vs Island						
	AGGREGATE PROSPECTING	LANDSCAPING	OCCASIONAL	COMMERCIAL	PWD	TOTAL	%
Vanua Lava	0	0	0	0	1	1	0.3
Santo	1	0	13	16	10	40	12.6
Malo	0	0	0	0	6	6	1.9
Aore	0	0	0	1	0	1	0.3
Ambae	0	0	6	0	4	10	3.1
Pentecost	0	0	1	0	41	42	13.2
Malekula	0	0	4	5	25	34	10.7
Epi	0	0	0	0	6	6	1.9
Efate	5	10	99	38	1	153	48.1
Erromango	0	0	0	0	2	2	0.6
Tanna	0	0	1	12	9	22	6.9
Aneityum	0	0	0	0	1	1	0.3
Total	6	10	124	72	106	318	
%	2	3	39	23	33		

The number of applications for an EIA tends to vary from year to year. For example, in 2012, 50 PEA (Preliminary Environment Assessment) reports were produced, and five EIA reports submitted. Of the five only two were approved, whereas three reports required further information. In 2013, 40 PEA reports were produced and three EIA reports submitted. The types of applications may include tourism infrastructure, wharf, quarry, desalination plant, aquaculture and a petrol station.

Impact

Without proper checks and procedures in place, there is a high risk that projects and major developments could contribute to immediate and long-term harm to Vanuatu's environment. As the majority of the project activities take place around the capital Port Vila and the northern town of Luganville, these sites are potentially vulnerable to adverse activities. Another potential impact concerns project activities in remote places where there is difficulty in the oversight by the DEPC.

Response

Vanuatu has developed its EIA process that is available online (www.environment.gov.vu) (Figure 134).

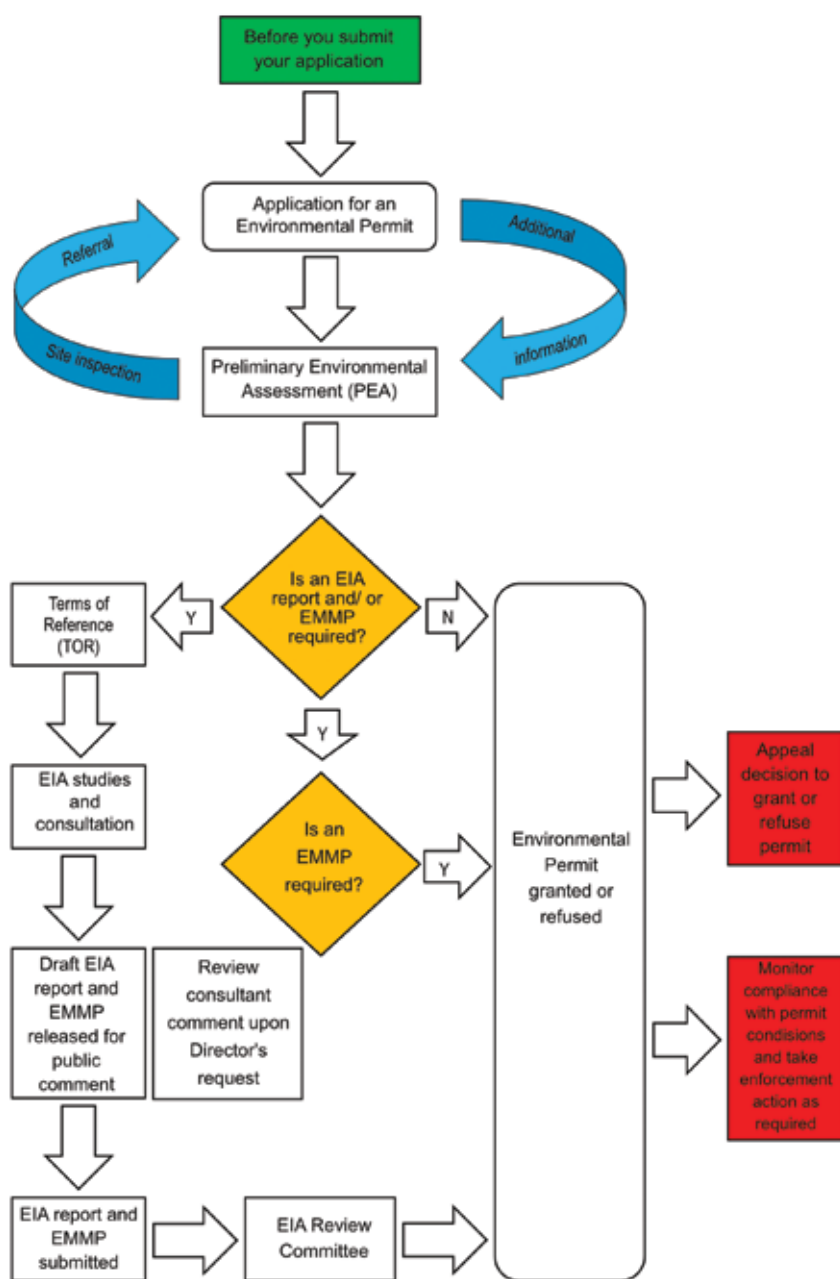


Figure 134: Vanuatu's EIA process that can be viewed online. (www.environment.gov.vu).

The EIA process is enacted by the EIA Regulations Order (Order No. 175 of 2011 and Amended Order No. 102 of 2019). A number of important developments under the EIA legislation includes:

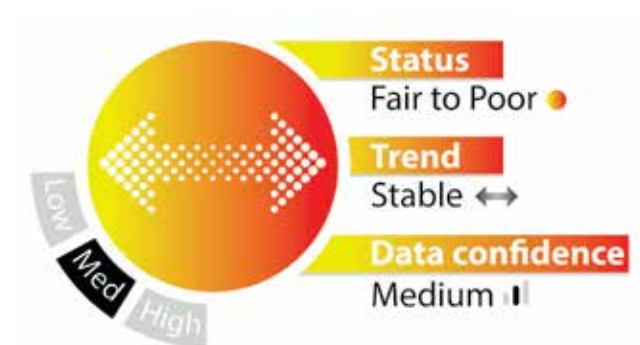
- Conduct of EIA
- Contents of EIA Report
- Development of an Environmental Management and Monitoring Plan
- An EIA Review Committee
- Registration of EIA consultants

Consultants that can undertake an EIA are required to be registered under the EIA legislation. As of 2020, there were three principal consultants and two review consultants registered.

Recommendations

- Ensure that staff vacancies are filled as soon as practical and that sufficient capacity development is incorporated in staff development process.
- Secure the necessary resources, especially equipment and funding to allow the government to meet its responsibilities successfully.
- Increase awareness on the EIA process to remote areas in Vanuatu to avoid non-compliance.

3.7.3 Compliance and Prosecution



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	 11.4	Rio Declaration on Environment and Development	SAMOA Pathway Noumea Convention	NSDP Env 4.4 NEPIP Objective 2

Indicator Definition

An important part of the Environmental Impact Assessment is to identify risk areas and provide the safeguards to ensure that the environment and society are not negatively impacted by any developments. If a proposed development has some risk to the environment, conditions may be imposed to reduce the risk or mitigate the impacts to the environment, or the health of communities. This indicator assesses the number of developments with environmental conditions that have been imposed and the number of prosecutions.

Status and Key Findings

A number of government agencies have compliance and monitoring units to ensure that proponents and stakeholders are following the legislation and policy requirements to reduce harm to the environment. Agencies such as the Vanuatu Fisheries Department, the Department of Forestry, the Department of Public Health, and the Ports and Harbour Authority, have well-established compliance and monitoring divisions. Prosecutions for non-compliance have successfully been carried out by some of the agencies (see Table 43 and Table 44. The Department of Geology and Mines, under the Ministry of Lands and Natural Resources, were able to enforce and prosecute a case under the Quarry Act (No., 9 of 2013) for illegal sand mining without the proper quarry permit (Camillia Garae pers. comm. 2022). The Department of Water Resources provides the oversight on matters relating to water supply and water resources management, have issued directive notices including prosecuting a case for non-compliance (Table 43).

	2020
Court cases	1
Direction notices	4
Penalty	1
Permits	15 (11 waterworks; 4 water use)
MOUs	12

Table 43: Department of Water compliance cases. (DoWR 2022)

YEAR	NON-COMPLIANCE CASES
2014	4
2015	1
2016	4
2017	8
2019	2

Table 44: Penalties issued for non-compliance in the Fisheries sector. Non-compliance issues may include unauthorised trans-shipment, pollution, and observer obstructions. (VFD 2022)

The DEPC is a relatively new authority when it comes to compliance and enforcement matters and are still in the development and building phase. The necessary legislation and policy have been developed and the capacity continues to be built. Awareness raising on the function of the Unit has contributed to the number of inspections and responses (Figure 135 and Figure 136).

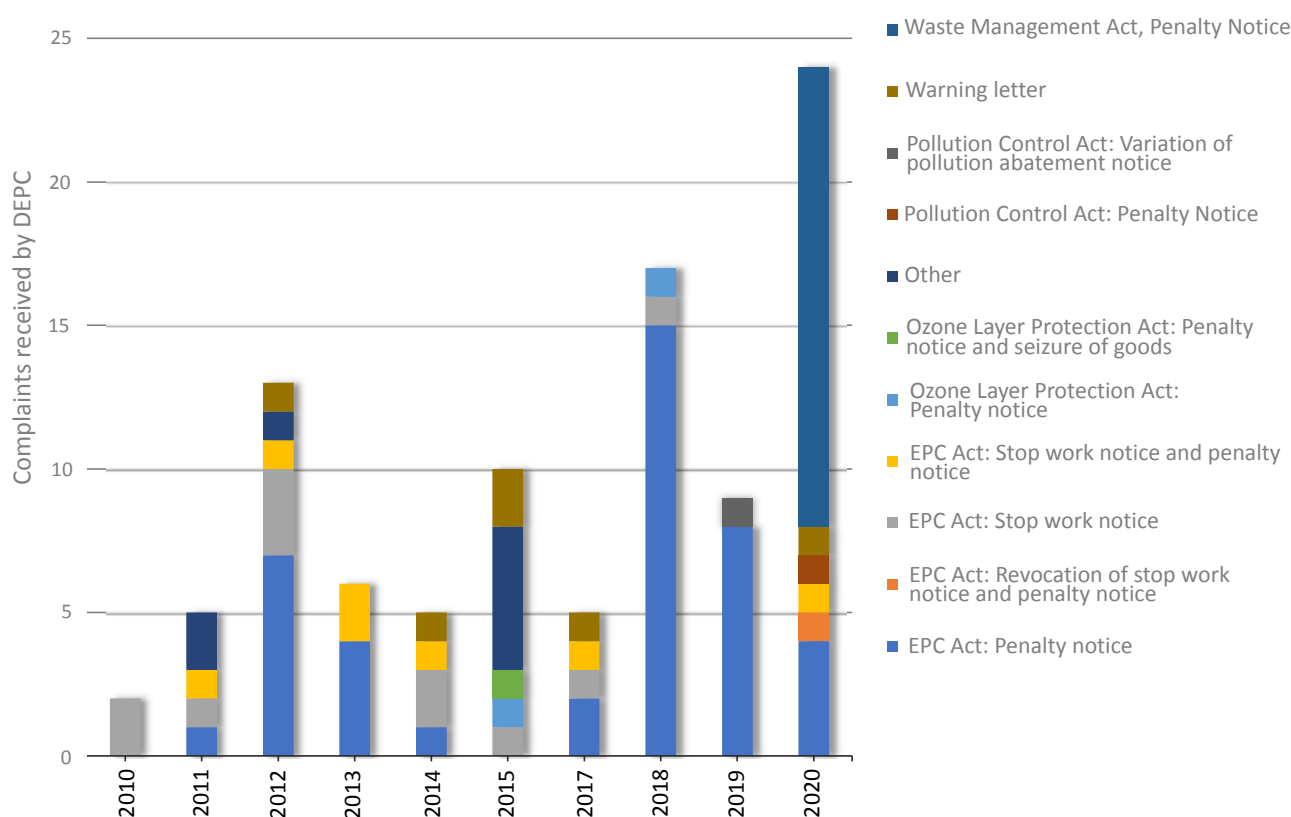


Figure 135: DEPC Environmental Compliance Responses (2010-2020). (DEPC)

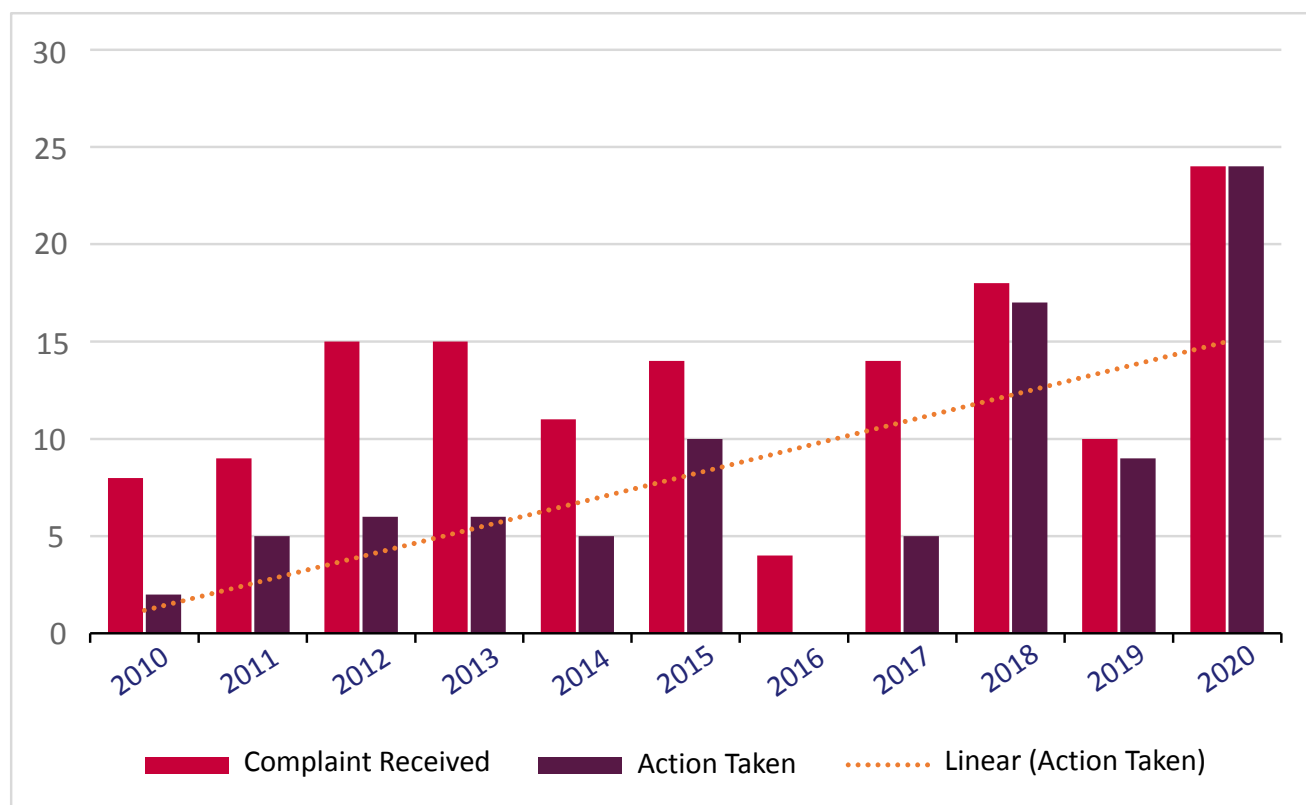


Figure 136: DEPC Environmental Compliance 2010-2020. (DEPC)

Since the DEPC's Monitoring and Evaluation section's establishment, some 470 proposals for an environmental impact assessment (EIA) have been received, with the majority of applications from Efate, Santo and Tanna. A third of the proposals received were still pending approval, whereas those that were approved had some 'Stop Work' notices issued due to non-compliance.

A key part of the compliance role is responding to community complaints on environmental issues and where feasible pursuing a prosecution. Most of the communities are aware of environmental issues, as well as their role in ensuring that their surroundings are protected. A large part of this awareness is attributed to organisations such as Live & Learn, Wan Smol Bag and government agencies.

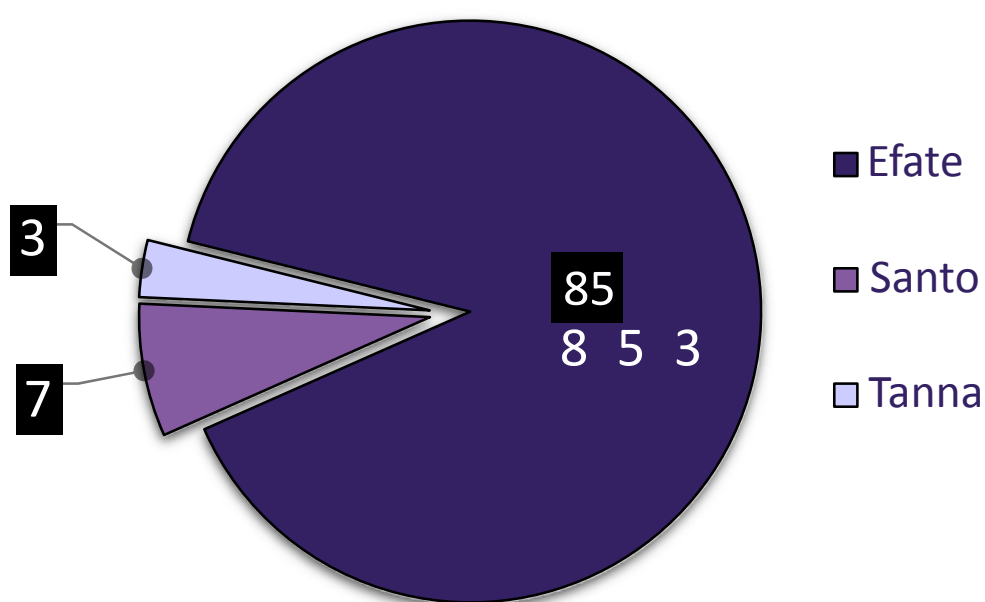


Figure 137: DEPC Reported Environmental Compliance Issues by Island 2010-2020. (DEPC)

One of the lessons was using the media to generate public awareness, which by de facto became the eyes and ears for DEPC's Compliance and Monitoring section. This has contributed to developers ensuring that they do the right thing. On other islands (Santo Tanna and Malekula), extension officers undertake inspections and provide reports to the Compliance Officer. Many of the remote places are rarely inspected for compliance, which may be an issue that needs further attention.

Impact

It is critical that the compliance and enforcement unit are given the necessary support and resources to ensure developers and projects are in compliance with EIA permits. Without this oversight, the environment will be impacted, as well as those of the communities. Communities need to be empowered and encouraged to report any issues that may be causing harm to their environment.

Response

The non-compliance to environmental laws can put biodiversity and community health at risk. The following legislations have been enacted as a safeguard for the environment:

- Environmental Protection and Conservation Act [CAP 283]
- Waste Management Act
- Ozone Layer Protection Act
- International Trade (Fauna and Flora) Act
- National Parks Act
- Environmental Impact Assessment Regulation
- Ozone Layer Protection (Fees and Penalty Notice) Regulations
- CITES Regulation

In addition to the above legislation, the following are also in support of conservation and sustainable use of resources:

- Department of water Resources:
 - » Water Supply Act
 - » Water Resources Management Act (Water Works Permit and Water Use Permit)
- Geology and Mines Unit
 - » Quarry Act
 - » Geothermal Act
 - » Petroleum Act
 - » Mines and Minerals Act

While the legislative framework has been developed the implementation remains a challenge due to inadequate capacity and resources. Some progress has been made with regards to capacity with the first Compliance Officer appointed to the DEPC's Support Services Division. However, a single officer to administer the near 500 project development applications and the follow up is inadequate, and therefore the capacity needs to be enhanced and expanded.

The decentralisation of the Department's work has allowed for the recruitment of Environment Extension Officers to three provinces. This will assist for better oversight of compliance activities.

Recommendations

- There is an urgent need to build local capacity, with a particular focus on project development activities and their impacts to the environment. The capacity needs to be at an adequate level (size) to match the current demands, as well as the obligations under the law.
- Funding constraints often mean that the staff are unable to do their work effectively. A clear funding strategy needs to be developed and implemented to assist officers fulfil a key part of their work activity.
- Developing guidelines and checklists to help staff undertake some of the technical roles they are expected to perform should be prioritised.
- Awareness raising is an important part of having an engaged community and stakeholders, so that they are fully versed of any project activities, the expectations and reporting/feedback avenues in case developers are not doing the right thing.
- Integrate environment performance into the management and operation of all companies, industries and businesses.
- Sharing of resources amongst compliance and monitoring officers of the various line ministries needs to be explored. This may necessitate the development of guidelines and templates that could be shared.

3.7.4 Environmental Funding Commitment



	CBD	SDG	INTERNATIONAL MEAS	PACIFIC REGIONAL MEAS	NATIONAL STRATEGIES
LINKS TO REPORTING OBLIGATIONS	 	NA		NA	

Indicator Definition

The value of the environment to the country can be measured based on the funding allocations the Government commits on an annual basis. For this indicator, it assesses the national funding allocated to the environment sector over the past ten years (2010-2020). External funding, secured through projects and grants, is not included in this assessment.

Status and Key Findings

The growth of the Department of Environmental Protection and Conservation from a unit to a Department in 2010, provides a recognition of the role it contributes to the socio-economic welfare of the country. The DEPC is divided into five divisions (Figure 138), and is staffed by 23 personnel including those under short-term contracts with projects. Only one position was vacant during the SOE process (Figure 139).



Figure 138: The six sections under the Ministry. (<http://www.environment.gov.vu>)



Figure 139: The five divisions under the Department of Environmental Protection and Conservation (<http://www.environment.gov.vu>)

The Vanuatu Government's 2010 Budget (VUV 16 billion) has increased by 124% in 2020 (VUV 36 billion) (Figure 140). The Ministry of Climate Change, Adaptation, Meteorology and Geohazard, Environment, Energy and Disaster Management's (herewith refers to as the Ministry) budget has also increased from 2010 (approx. VUV 322 million) to 2020 (VUV 658 million) or a 104% increase (Figure 141). The Department of Environmental Protection and Conservation, which comprises of the five Divisions, has a budget allocation of around VUV 18 million in 2010, increasing to VUV 61 million in 2020 (an increase of around 227%) (Figure 142). While these numbers can seem large, when the proportion of increase between the Government's annual budget and the Ministry is evaluated, there is a subtle negative trend (Figure 143).

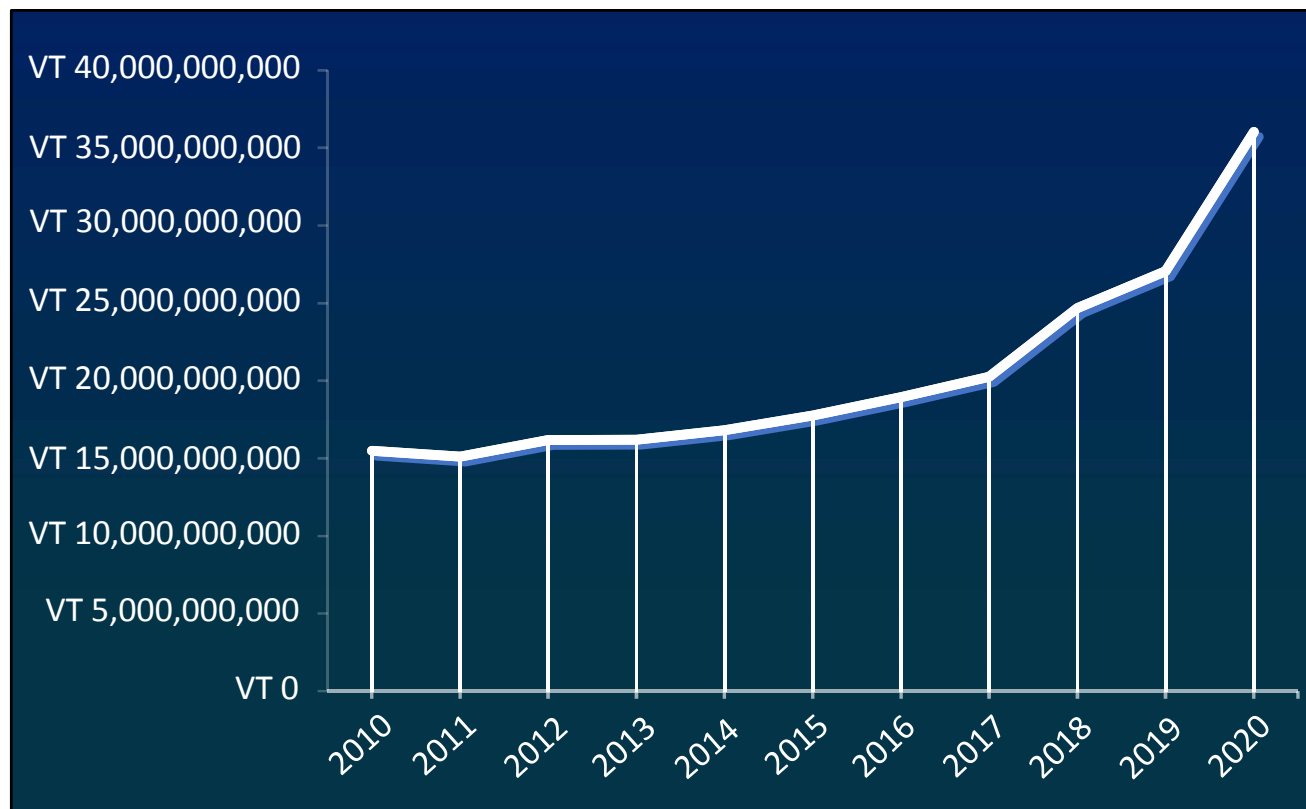


Figure 140: Vanuatu's national budget from 2010 to 2020. (Government Budget Narrative Reports from 2010-2020)



Figure 141: The annual budget for the Ministry from 2010 to 2020 period. (Government Budget Narrative Reports from 2010-2020)

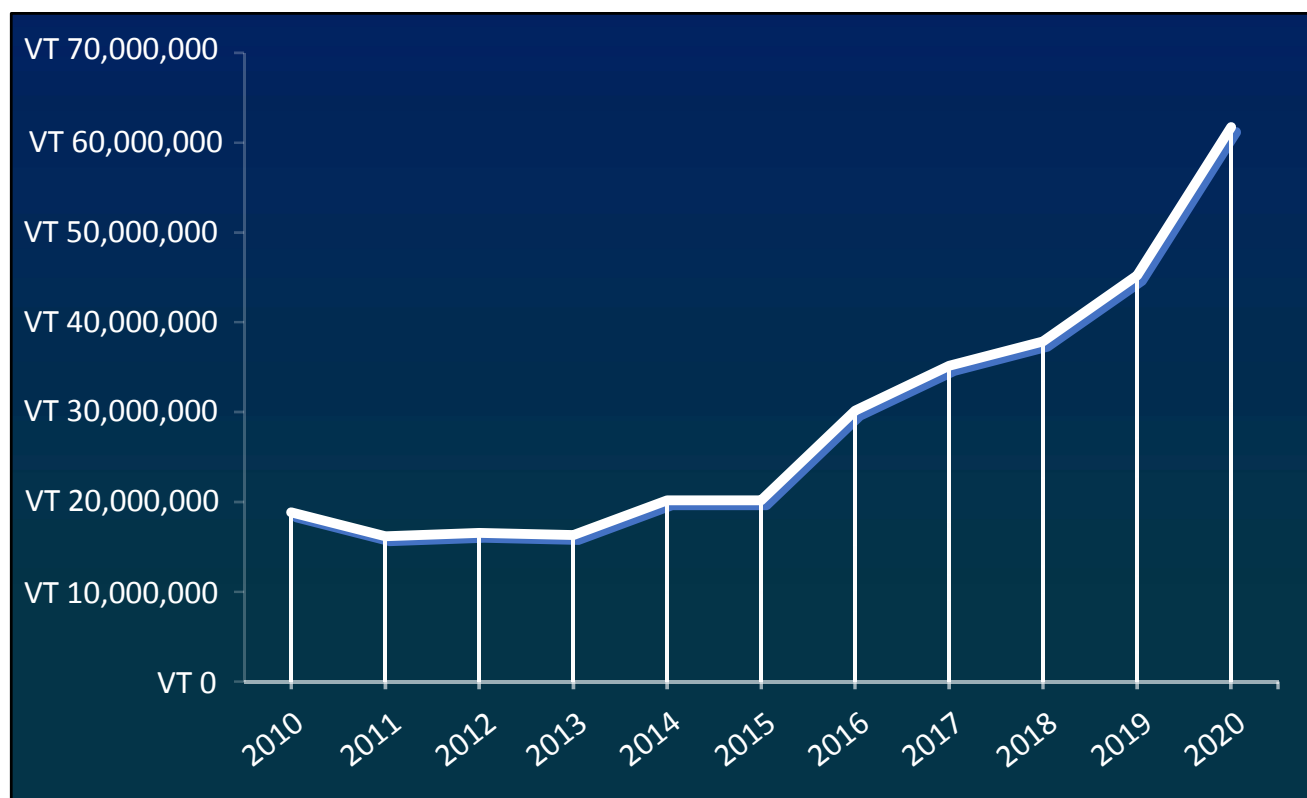


Figure 142: The Department of Environmental Protection and Conservation's annual budget. (Government Budget Narrative Reports from 2010 to 2020)

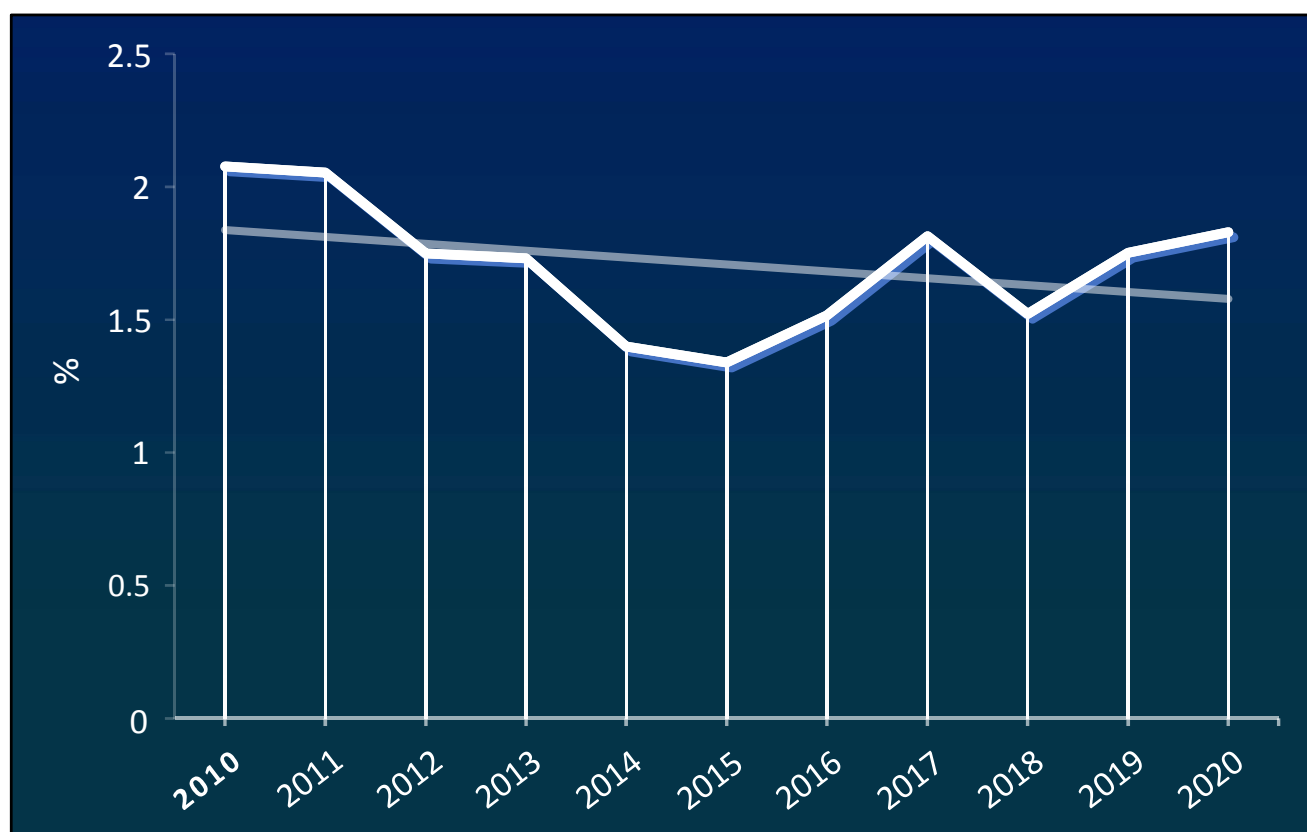


Figure 143: Proportion of the Ministry's budget against the Government's budget for 2010 to 2020. (Government Budget Narrative Reports from 2010-2020)

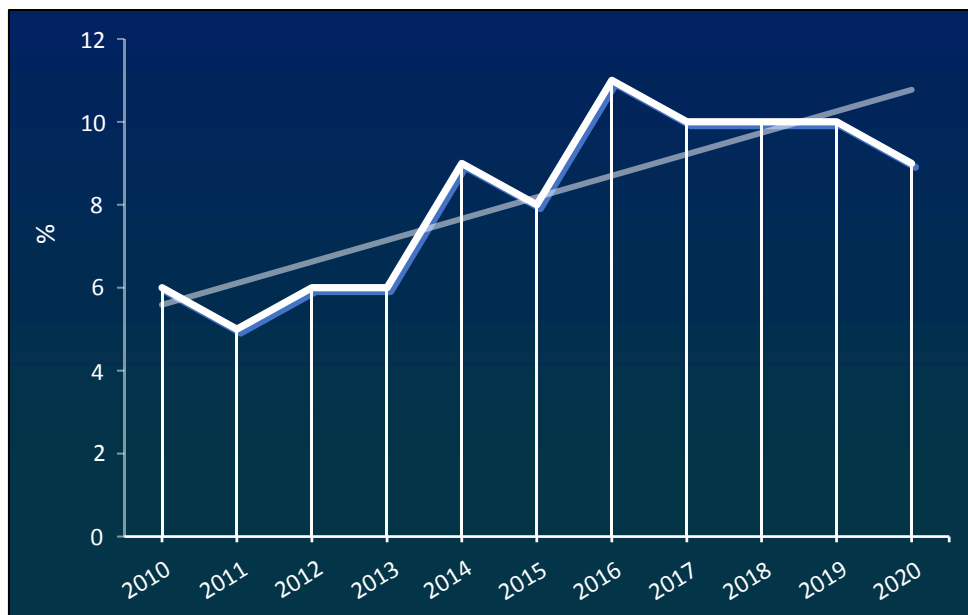


Figure 144: Proportion of the Department of Environmental Protection and Conservation's budget against the Ministry's budget allocation for the period of 2010 to 2020. (Government Budget Narrative Reports from 2010-2020)

The recent expansion of the Ministry and the breadth of its mandate should warrant a budget that is commensurate with its responsibilities. There are five Departments under the Ministry plus the corporate service (Figure 138) sharing a budget of around 2% of the total Government's budget. In 2019 this allocation was VUV 473 billion increasing to VUV 658 billion in 2020.

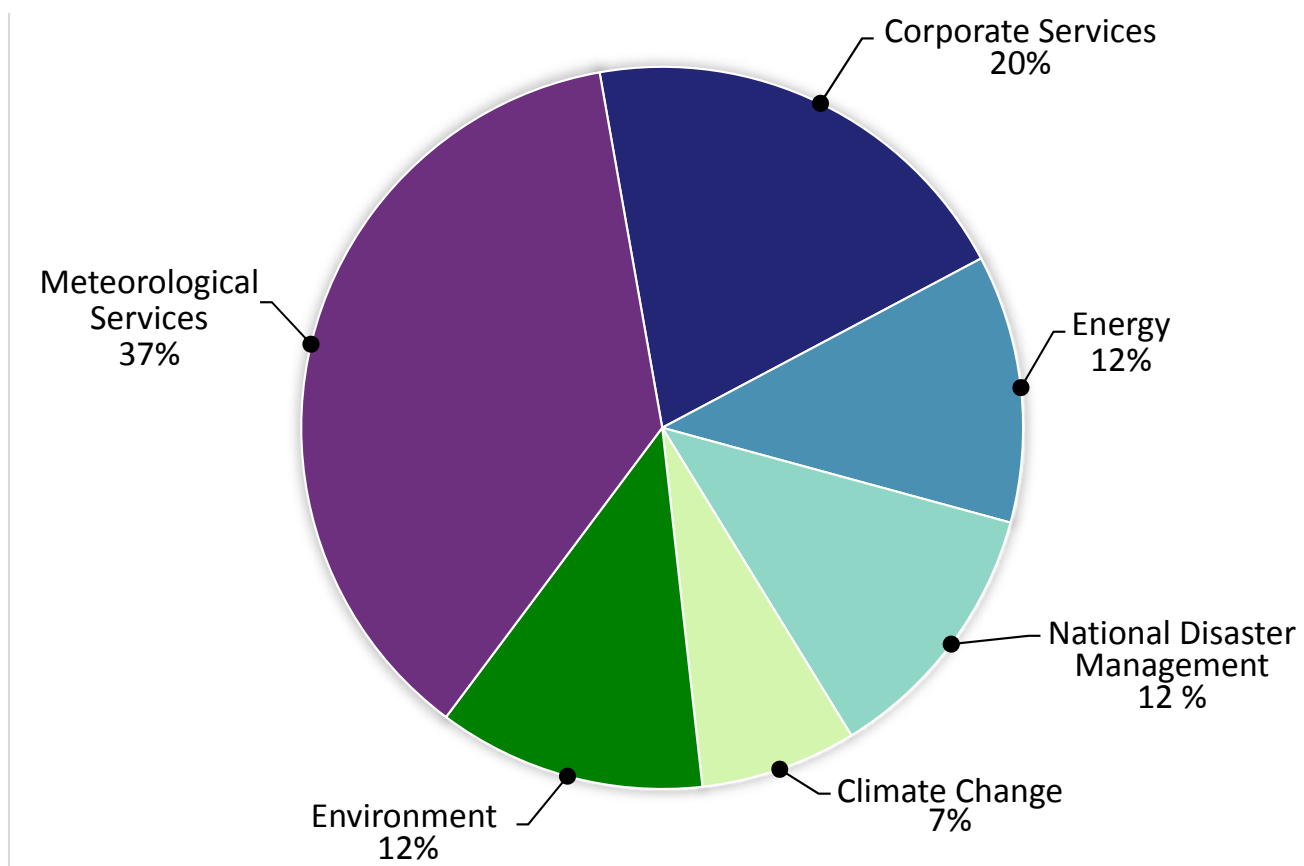


Figure 145: The budget allocation for the five departments and the Corporate Service of the Ministry for 2019. (Government Budget Narrative 2019).

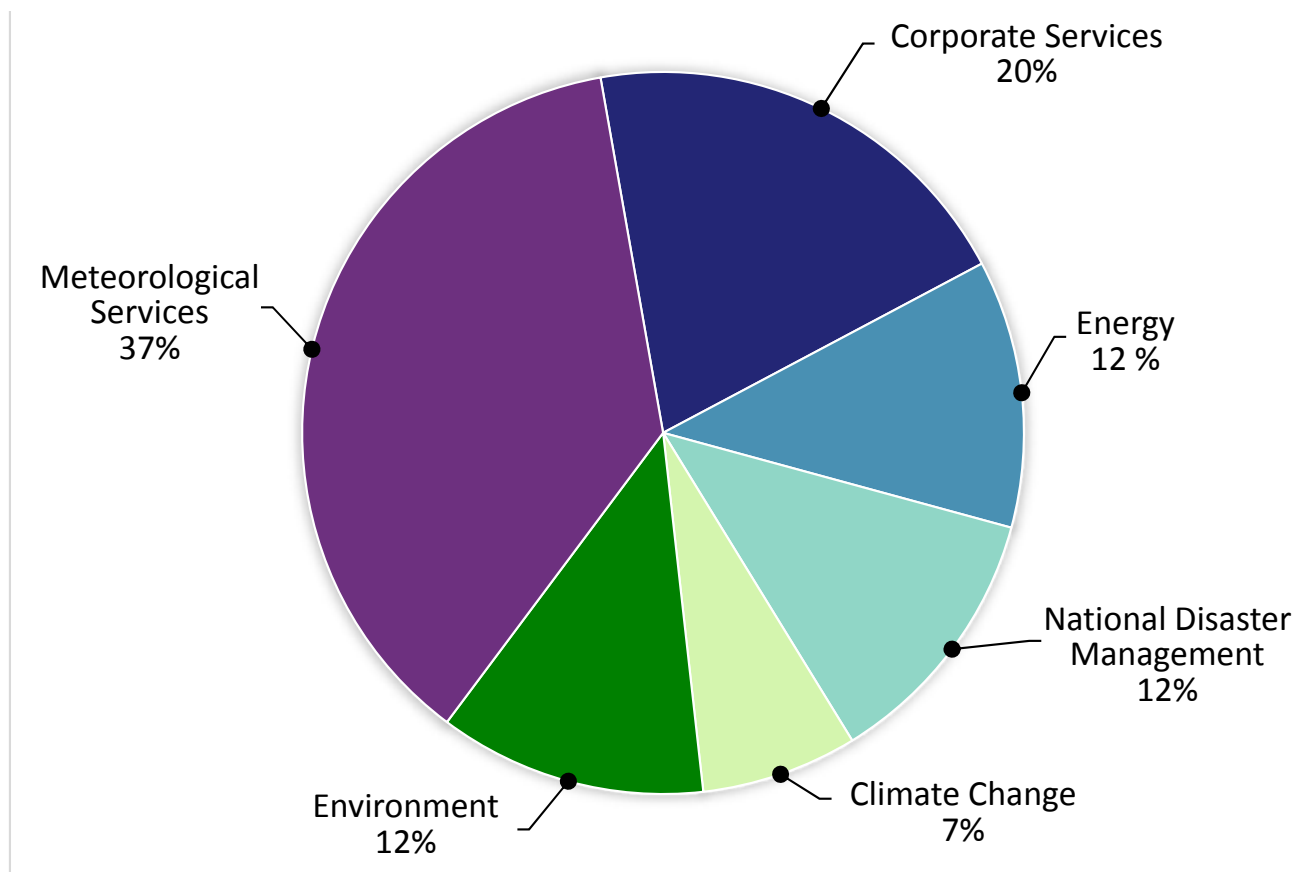


Figure 146: The budget allocation for the five departments and the Corporate Service of the Ministry for 2020. (Government Budget Narrative 2020).

The allocations for the DEPC comprise only a small fraction of the Ministry's total budget (Figure 145 and Figure 146). However, it is promising that the Ministry's budget has increased since 2010 in proportion with the growing national budget. An adequately funded DEPC will be more effective at achieving Vanuatu's national goals and objectives as defined by the NSDP 2016-2030, NEPIP 2016-2030, NBSAP 2018-2030, NWMS 2016-2020, and NISSAP 2014-2020.

Despite the increase in budget allocations in 2020, DEPC took a 2% decrease since the 2019 allocation. This may have contributed to some of the officers' positions remaining vacant, with implications on the work load and outputs.

Impact

The lack of adequate financial commitment to the environmental sector can seriously compromise the integrity of Vanuatu's ecological systems, and therefore the lives of the people. The funding allows for the recruitment of human resources and operation that are needed to implement the activities that promote the management, conservation and sustainable use of all resources. While there is always an ongoing challenge of prioritising limited resources to ensure that communities are cared for, the environment should always be one of the top Government priorities. There is a concern that budget allocation for the Ministry and the DEPC is contracting and not keeping pace with the allocated ministerial budget. The current allocations appear inadequate to address the vastness of the country and the scope of issues under the mandate of DEPC, and its line Ministry.

Response

The National Sustainable Development Plan 2016-2030 identifies Environment as one of the key pillars in realising the national vision. Many of the Government's policies promote and prioritise the environment. One of the clear outcomes from this assessment is that the Government has not fulfilled its commitment to provide sufficient budget to implement policy directives.

Recommendations

- There is a need to demonstrate the value of Vanuatu's natural resources and its contribution to the national economy.
- It is recommended to increase the DEPC's annual budget (as a proportion of the national budget) in order to facilitate the achievement of national environmental objectives, mitigate the impact of pressures on Vanuatu's environment, and maintain the ecosystem services that support the national economy, food security, health and other sectors.

Environmental Governance References

DoWR 2020. Information collection and compliance. Inspection Report – Etas Landfill Leachate Pond. Monitoring and Evaluation Unit. Department of Water Resources. Pp. 1-5.

Government of Vanuatu, Department of Environmental Protection and Conservation (2021)

Government of Vanuatu, Ministry of Finance, Annual Reports 2010 to 2020. Port Vila.

Government of Vanuatu. 2017. Vanuatu's National Environment Policy and Implementation Plan 2016-2030. Apia, Samoa. SPREP. 52p.

Government of Vanuatu. Budget 2019. Vol. 3. Program Budget Narrative. Pp. 1-321. Prime Minister's Office. Department of Strategic Policy, Planning and Aid Coordination.

UNESCO 2012. World Heritage Committee. Periodic Reports. Final report on the results of the second cycle of the Periodic Reporting exercise for Asia and the Pacific. World Heritage 36 COM. 65p.

PART FOUR: SUMMARY AND RECOMMENDATIONS

Vanuatu's environment continues to be changed by global drivers, with climate change affecting the whole country. Population growth and globalisation enticing people living in rural communities to migrate towards 'perceived prosperous' urban centres are also drivers and pressures that are contributing to environmental change. Economic developments have led to a heavy reliance on imports, such as fuel for the energy and transport sectors, as well as readily accessed goods and services. The impacts have contributed to a rise in greenhouse gas emissions, increased waste generation and the erosion of culture, traditional knowledge and vernacular. The drivers, pressures, with their impacts and the response by the Government, provinces, municipalities, communities and organisations are assessed in this State of the Environment Report.

Vanuatu has a national agenda captured in the National Sustainable Development Plan 2016 to 2030, with three overarching pillars of society, environment and economic. The environmental pillar focuses on food and nutrition security, blue-economic growth, climate and disaster resilience, natural resource management, and ecosystems and biodiversity. These goals are the focus of Vanuatu's State of the Environment Report. The link between the NSDP and the SOE is provided in Table 45.

Table 45: The link between the State of the Environment 2022 Report with the National Sustainable Development Plan.

NATIONAL SUSTAINABLE DEVELOPMENT PLAN	SOE 2022 REPORT
ENV1: Food and Nutrition Security - ENV1.1 Agricultural and fisheries production - ENV1.4 Knowledge and skills in food production, preservation and adaptation.	Theme 2: Land – Agriculture Theme 3: Marine & Coast - Fisheries Theme 6: Culture & Heritage – Food Production & Consumption
ENV2: Blue-Green Economic Growth - ENV2.2 Minimal disturbance to the environment from developments - ENV2.4 Waste management and pollution control - ENV2.5 Environmental governance - ENV2.6 Adequate financial resources	Theme 3: Marine & Coast – Coastal Water Quality Theme 5: Built Environment – Renewable energy. Waste management Theme 7: Environmental Governance – Environmental Impacts Assessment; Compliance & Prosecution
ENV3: Climate and Disaster Resilience ENV3.2 Monitoring and early warning systems	Theme 1: Atmosphere & Climate
ENV4: Natural Resource Management - ENV4.2 Protect vulnerable forests, watersheds, catchments and freshwater resources, including community water sources - ENV4.3 Prevent land degradation and downstream environmental damage from mineral resource extraction - ENV4.4 Promote sustainable development of the fisheries sector - ENV4.5 Reduce and prevent the degradation and erosion of foreshore and coastal areas - ENV4.6 Reduce deforestation and ensure rehabilitation and reforestation - ENV4.7 Build capacity and support local communities in resource management	Theme 2: Land – Forests Theme 3: Marine & Coast – Fisheries; Coastal Water Quality; Marine Protected Areas; Theme 4: Biodiversity – Wetlands; Conservation and Protected Areas Theme 5: Built Environment – Potable Water Theme 7: Environmental Governance – Environmental Impact Assessments; Compliance and Prosecution

NATIONAL SUSTAINABLE DEVELOPMENT PLAN	SOE 2022 REPORT
ENV5: Ecosystems and Biodiversity • ENV5.1 Protect biodiversity and ecosystems • ENV 5.2 Create and manage conservation and protected areas • ENV 5.3 Support local conservation and protection of endangered, threatened or endemic species and ecosystems including through traditional knowledge and practices • ENV 5.4 Protect borders and environment through effective customs and biosecurity services • ENV 5.5 Increase awareness on biodiversity conservation and environmental protection issues across government and publicly • ENV 5.6 Enhance environmental monitoring, evaluation and research with relevant, open and transparent data sharing among relevant agencies	Theme 3: Marine & Coast – Marine Protected Areas Theme 4: Biodiversity – IUCN Red List Species; Environmental Invasive Species; Conservation and Protected Areas; Theme 7: Environmental Governance – Environmental funding commitment

The overall assessment found Vanuatu's environment is in a fair state, with over 75% being fair to good (Figure 147). The indicators in the Atmosphere, Biodiversity, Marine and Coast, and Governance themes made up the majority of the fair to good state, whereas Built Environment and Culture and Heritage indicators were generally in a poor state.

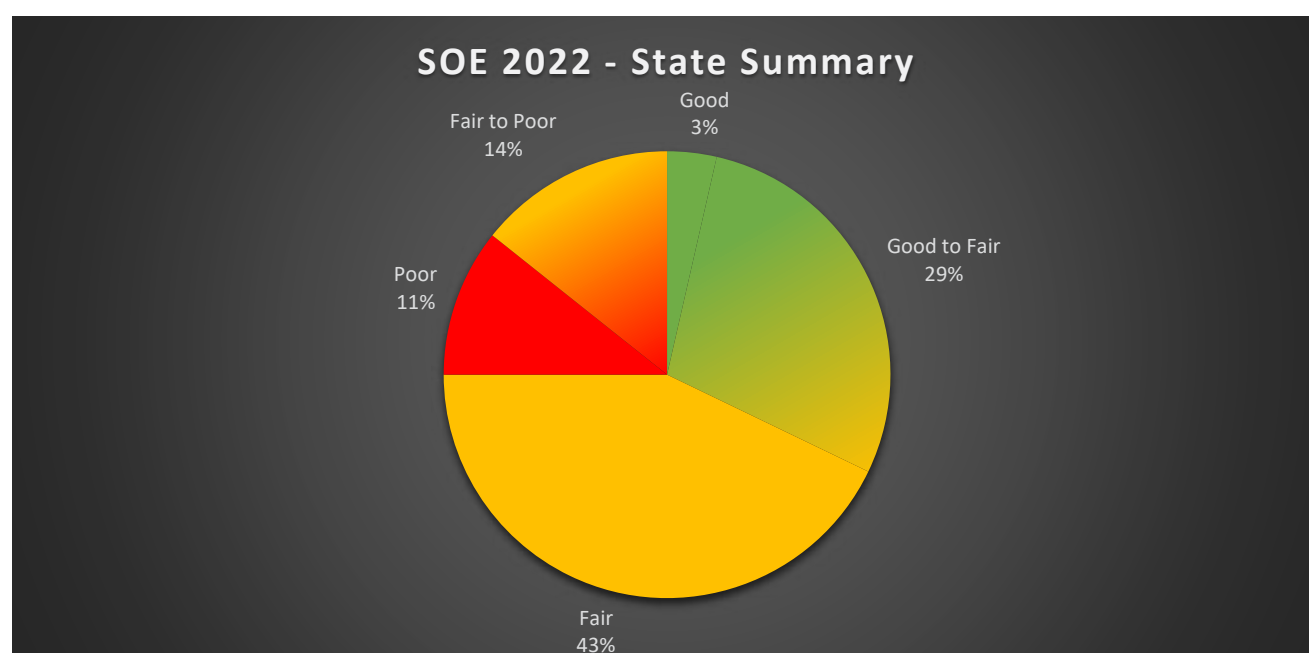


Figure 147: Summary of the state of Vanuatu's environment.

The overall trend for Vanuatu's environment is stable or improving (Figure 148). Most of the improvements were observed in the Built Environment and Biodiversity themes, largely attributed to efforts to address the environmental challenges. The thematic areas that will need interventions with a deteriorating trend is Marine and Coast due to declining reef health, coastal water quality and the over-exploitation of marine resources. The Culture and Heritage is also deteriorating largely due to the decline in indigenous languages and the loss of traditional knowledge.

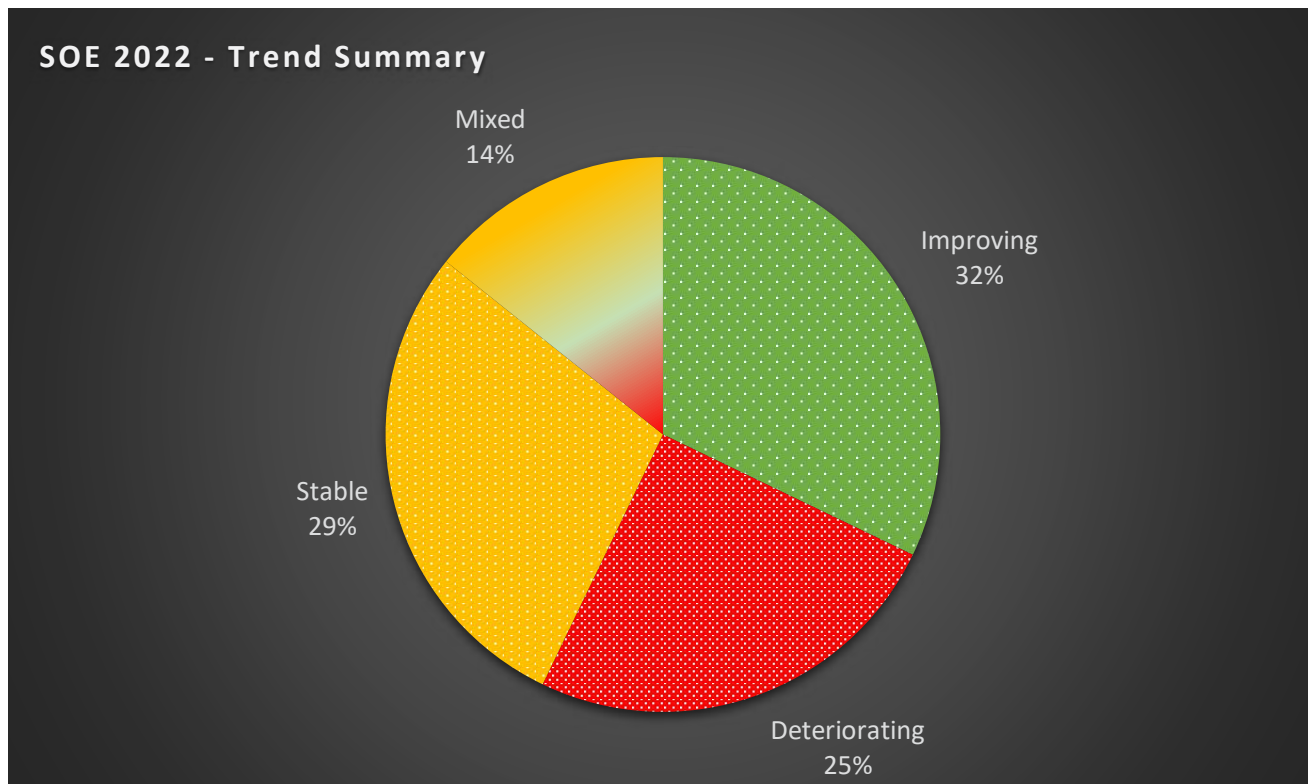


Figure 148: Summary of the trends of Vanuatu's environment.

The data and information used for the assessment were considered to be good (medium to high) (Figure 149), as most of the data were collected by the various line ministries, publications in peer reviewed journals or expert views.

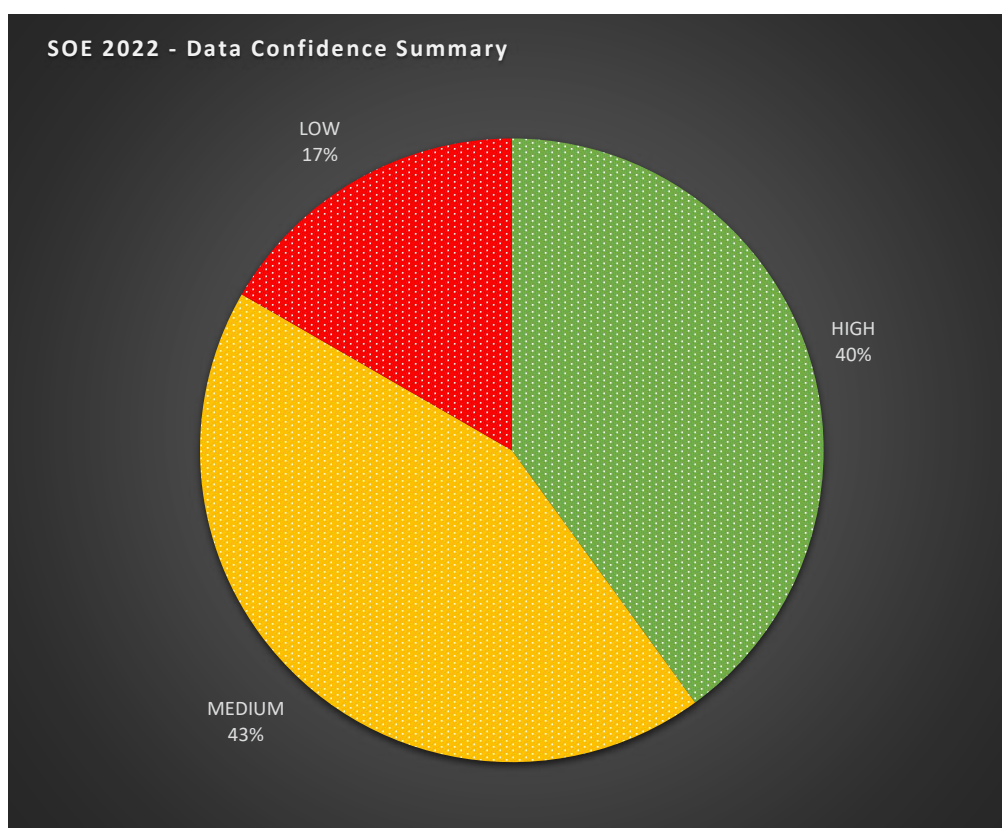
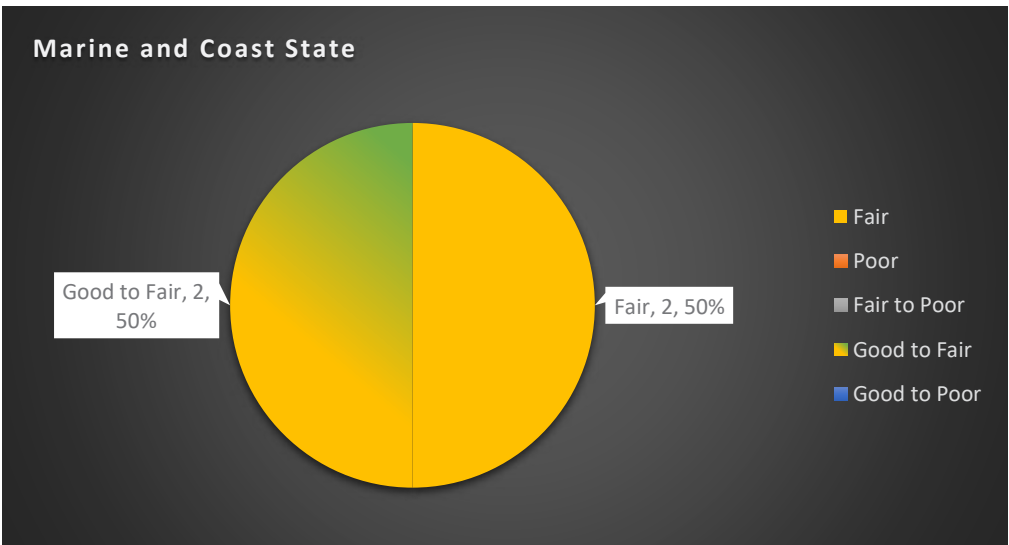
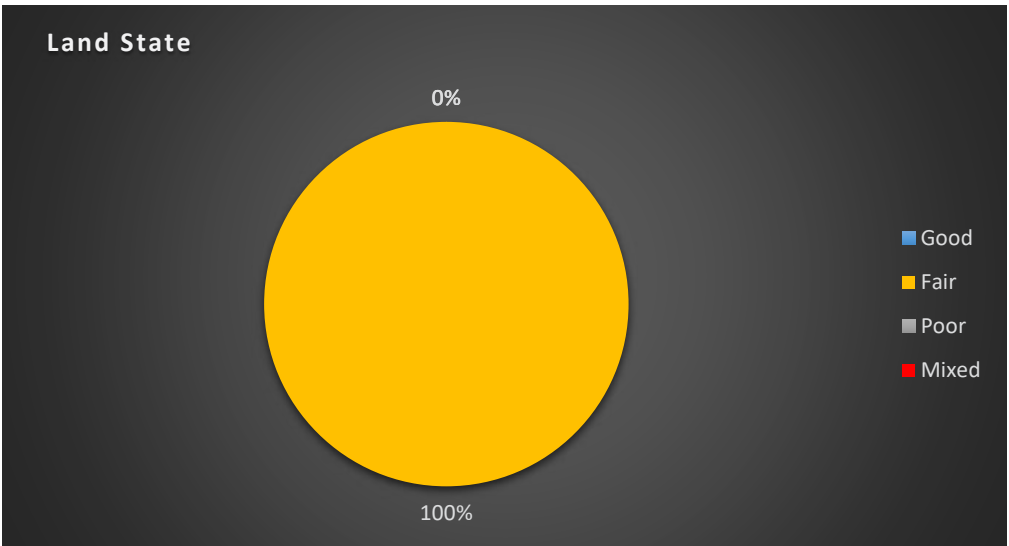
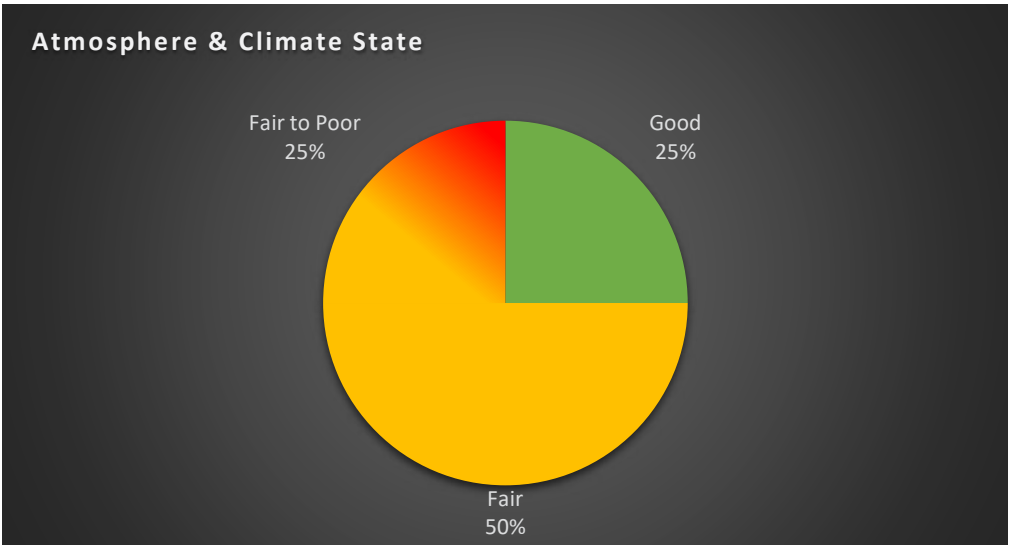
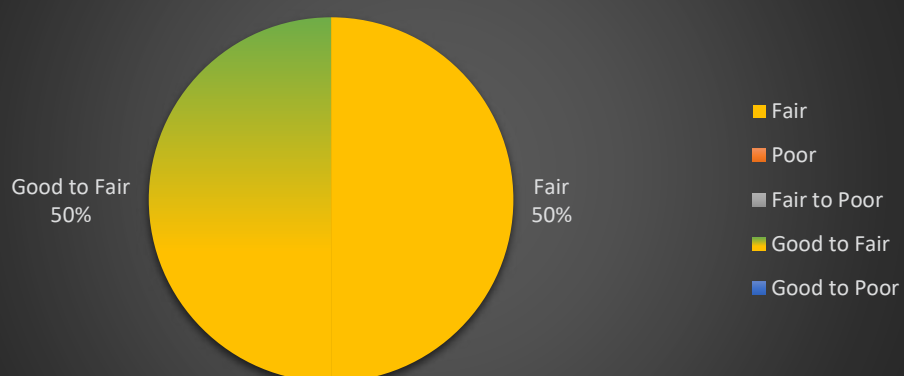


Figure 149: Summary of the level of confidence on the data used for the SOE.

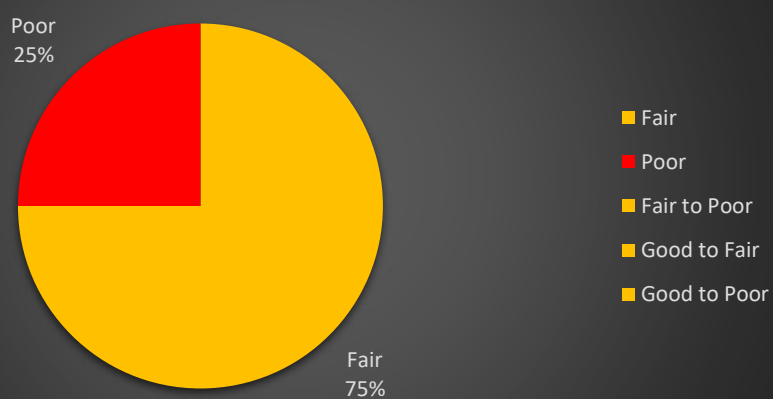
State of the key thematic areas



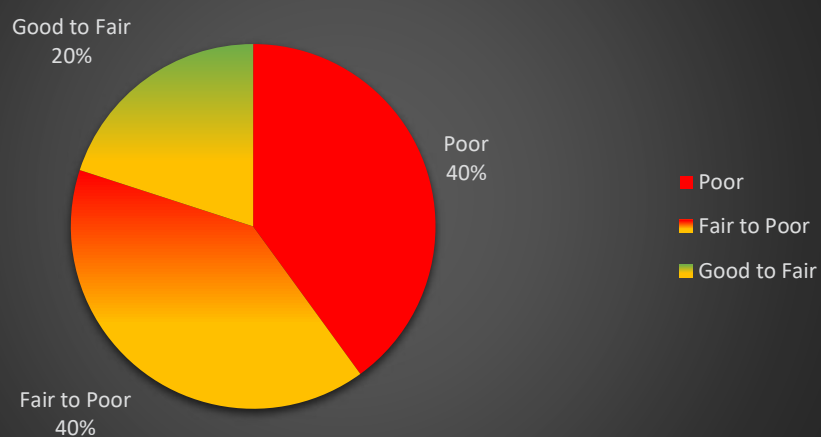
Biodiversity State

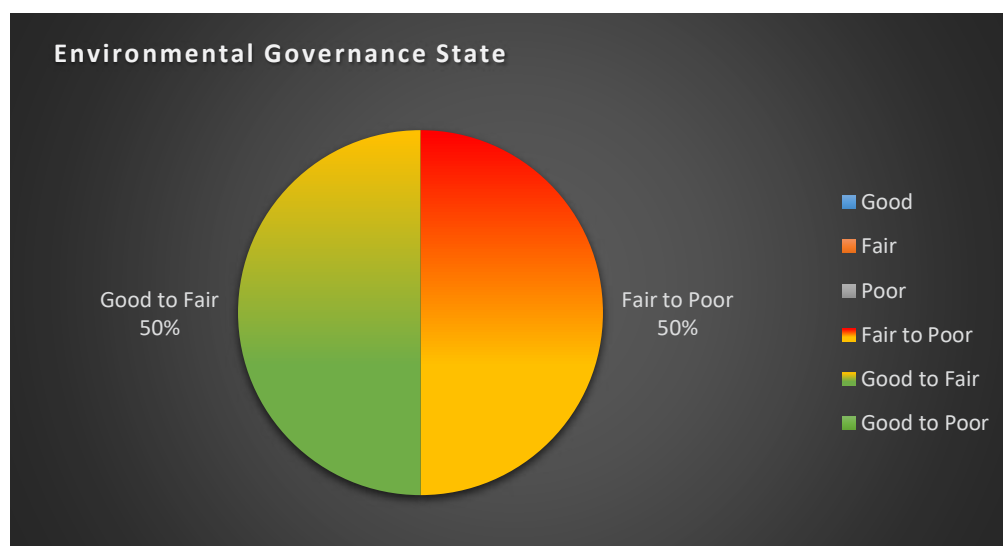


Built Environment State



Culture and Heritage State





Recommendations

Many of the recommendations are identified within each of the thematic areas. There are recommendations that are shared amongst the seven themes, such as capacity building, improved governance and coordination, securing resources and strengthening community awareness and engagement. These over-arching recommendations, as well as those specifically relating to future state of environment reports are outlined below.

National State of Environment Reports to be produced every five years

Vanuatu's state of environment reports are a legal requirement under the Environmental Management and Conservation Act 12 of 2002: Div. 1 (4) Functions of the Director – 2(b) Prepare State of the Environment Reports under section 7. Div. 2 – Instruments, section 7 - Preparation of the National State of the Environment Reports. Section 7 (1) requires the Director to prepare and publish a SOE at least once every 10 years. It is 20 years since the Act was passed and the first SOE to be produced. The stakeholders recognise that a regular assessment within a five-year timeframe is preferable to the current stipulation under the Act, as this will provide an earlier health check and interventions to protect the environment.

Establish a national meta-data hub to harvest data and metrics relating to the National Sustainable Development Plan 2016-2030.

There is a need for a national data hub or a meta-database that allows government agencies to upload and share information within a secure environment. This will benefit future SOE and SDP reporting. A national framework needs to be developed and approved by the necessary authority to mandate agencies and ministries to collaborate and share resources.

Resource management and monitoring

Vanuatu's resources are being challenged by over-exploitation, habitat degradation and by climate change through global warming and exacerbating climate extremes. The exact effect on the resources, especially species populations and the quality and quantity of resources, is still poorly documented. The SOE recognises that much more needs to be done to enumerate the state and the trends of Vanuatu's resources and improve the level of confidence on the data.

Identify capacity building needs and opportunities

A capable workforce that is well resourced is required to achieve many of the policies and organisations goals. Capacity building is key to having a capable workforce. By identifying and working with individuals and organisations to maximise their strengths, and address any weaknesses, is a key step in building an organisation's capacity. This is an ongoing process that may require specialised training either in-house, externally at tertiary institutions, or it may require workshops and on-the-job training. Regular reviews of organisation and individual capacity needs should be encouraged, and any deficit should be prioritised for addressing.

Explore the feasibility of harmonising a national registry on community engagement in the areas of resource conservation and management

The various government ministries and non-governmental organisations have engaged closely with remote communities, as well as those within the urban centres of the country. The efforts and the results in the areas of resource conservation and management are often unreported. Organisations are often working in silos, despite the fact that the outcomes are similar and the modus operandi are shared, such as valuing community inputs and recognition of culture and traditional systems. The government has supported these engagements by passing legislation mandating government agencies to work with communities. The Environment department works with communities on community conservation areas according to the Environmental Management and Conservation Act, the Fisheries department also works with communities on conservation measures for in-shore areas under the Fisheries Regulations. Conservation of inshore areas may be for the purpose of protecting cultural sites and traditional works of art. The Vanuatu Kaljoral Senta also has a National Heritage Registry, which may include sites that are protected under the Fisheries, Environment and Forestry departments. This highlights the need for harmonisation of the various agency registries, so that support to communities is coordinated and resources are efficiently being used.

Strengthen Inter-agency collaboration

The aforementioned recommendation on harmonising a national registry can only be achieved through trust and having a strong collaboration amongst the various government agencies. The Government could provide the framework through directives and legislating ministries to spearhead collaborations, but the hurdle continues to be the rapport between individuals.

Strengthen co-management between the formal and the traditional systems

Despite the recognition of traditional systems in the Constitution and various Government legislation and policies, there is still some mistrust between the traditional system and the Government. Within the area of resource management, it provides the opportunity for the marrying of the two systems for the benefit of the community. Trust, assurance and openness are important attributes that communities are looking for from the Government.

Strengthen and Value Partnerships

The SOE has highlighted some of the deficiencies that the Government and communities are faced with. One of these deficiencies is the lack of resources to rebuild, repair or to maintain the infrastructure at the local, provincial and national levels. One of the solutions is to strengthen the partnership of local organisations, including government agencies, with development partners and the private sector, to identify specific areas where support is most needed.

Sustainable financing

Underpinning many of the development deficiencies within the country is the lack of financial resources. Projects have contributed to improving some of the deficiencies, but as these are often short-term, the benefits are also limited. Developing a sustainable funding plan could be a solution in helping to resolve the country's environmental challenges.

REFERENCES

- Anon, 1992. Country Report for UNCED. Vanuatu. National Reports to the United Nations Conference on Environment and Development (UNCED). SPREP. Apia, Western Samoa. 70p.
- Anon, 2010. Vanuatu National Assessment Report. 5 Year Review of the Mauritius Strategy for further implementation of the Barbados Programme of Action for Sustainable Development. Port Vila. 26p.
- Bani, E. 2002. Vanuatu Second National Report to the Conference of the Parties. Environment Unit. Port Vila, Vanuatu. 94p.
- Brodie, JE., et al. 1990. State of the marine environment in the South Pacific Region. UNEP Regional Seas Reports and Studies No. 127. SPREP Topic Review No. 40. UNEP 1990.
- Environment Unit, 1998. Vanuatu National Report to the Conference of the Parties. May, 1998. Convention on Biological Diversity (CBD). Ministry of Agriculture, Livestock, Forestry, Fisheries and Environment. Port Vila, Vanuatu. 22p.
- Government of Vanuatu. 1980. Vanuatu Country Report. South Pacific Regional Environment Report. SPREP/Country Report 15. November 1980.
- Kinch, J., Anderson, P., Richards, E., Talouli, A., Vieux, C., Peteru, C., Suaesi, T. 2010. Outlook Report on the State of the Marine Biodiversity in the Pacific Islands Region. SPREP. Apia, Samoa. 44p.
- King, P. 2007. Country Environmental Analysis: Vanuatu. Asian Development Bank, 89 pp.
- Mourgues, A. 2005. Country Environment Profile 2004. European Commission. Port Vila. 74 p.
- VNSO (Vanuatu National Statistics Office), 2020. National Population and Housing Census. Basic Tables Report Vol. 1. UNFPAS, SPC. 351p.
- WEIGHTMAN B. 1989. - Agriculture in Vanuatu. A historical review. British Friends of Vanuatu, Surrey, UK, J20p.

ANNEX 1 – List of Contributors

NAME	DESIGNATION	ORGANISATION
Ada Sokach	Senior Finfish Biologist	Vanuatu Fisheries Department
Allan Rairai	Manager: Climate Services	Vanuatu Meteorology and Geo-Hazards Department
Annabelle Alilee	Pollution Control Officer	Department of Environmental Protection and Conservation
Benjamin Titus	Mining Engineer	Geology and Mines Unit
Brooks Rakau	Manager: Monitoring and Evaluation	Department of Water Resources
Camillia Garae	Commissioner of Mines	Geology and Mines Unit
Dean Wotlolan	Senior Conservation Officer	Department of Environmental Protection and Conservation
Donna Kalfatak	Director	Department of Environmental Protection and Conservation
Dr Gregory Plunkett	Botanical Expert	New York Botanical Garden Department of Forestry Herbarium
Dr Vincent Lebot	CIRAD Researcher	CIRAD Department of Agriculture & Rural Development
Dr. Christina Shaw	Chief Executive Officer	Vanuatu Environment Science Society
Erie Sami	Senior Officer, Hydrogeologist	Department of Water Resources
Florence lautu	Manager	National Advisory Board – Climate Change & Disaster Risk Reduction
Gary Erick	Principal Scientific Officer – Rural Electrification	Department of Energy
George Matariki	Water Quality Officer	Department of Water Resources
Hanington Tate Tamla	National Project Coordinator	FAO-GEF-ISLCM Project
Henry Worek	Director	Department of Ports and Harbours
Ionie Bolenga	Principal Officer: Waste Management and Pollution Control	Department of Environmental Protection and Conservation
Jayven Ham	Principal Officer: Fisheries Biologist	Vanuatu Fisheries Department
Jeffrey Kaitip	Acting Director	Department of Urban Affairs and Planning
John Ruben	Principal Scientific Officer: Research and Development	Vanuatu Meteorology & Geo-Hazards Department
Johnethy Morris	Cadet	National Disaster Management Office
Johnie Tarry Nimau	Senior Monitoring and Evaluation Officer	Department of Climate Change
Johnson Peter	Compliance Officer	Department of Water Resources
Jope Davetanivalu	Director, Environmental Monitoring and Governance Programme	Secretariat of the Pacific Regional Environment Program
June Brian Molitaviti	Manager Research and Aquaculture Division	Vanuatu Fisheries Department
Kalvin Amos	Assistant Auditor	Vanuatu National Audit Office
Lilly Fatdal	Senior Biosecurity Officer	Biosecurity Vanuatu
Lucy Joy	Principal Data Officer	Vanuatu Fisheries Department
Lucy Obed	Teaching Assistant	The University of the South Pacific
Martika Tah	Project Scientist	Vanuatu Environment Science Society

NAME	DESIGNATION	ORGANISATION
Mark O'Brien	Regional Coordinator	BirdLife Pacific
Matthew Tasale	Principal Officer Electrification	Department of Energy
Michel Leodoro	Geoscientist	Geology and Mines Unit
Mimosa Bethel	Invasive Species Officer	Department of Environmental Protection and Conservation
Naomay Napuram	Principal Officer, Environment and Planning Assessment Division	Department of Environmental Protection and Conservation
Nigel Batie	SOE Assistant Coordinator	Department of Environmental Protection and Conservation
Oliva Joe	Intern	NDMO
Osborne Melenamu	Senior Environmental Engineering Officer	Department of Environmental Protection and Conservation
Paul Anderson	INFORM Project Manager	Secretariat of the Pacific Regional Environment Program
Philip Meto	Provincial Liaison and Coordination Officer	National Disaster Management Office
Priscilla Bongnebu	Auditor/ IT Manager	Vanuatu National Audit Office
Ratu Bani	WASH Officer	Department of Public Health
Richard Patterson	Assistant Ozone Officer	Department of Environmental Protection and Conservation
Riddick Cevuard	GIS Specialist	FAO-GEF-ISLCM Project
Rolenas Tavue Baereleo	Principal Officer: Biodiversity and Conservation	Department of Environmental Protection and Conservation
Rontexstar Mogeror	Senior Officer: Provincial Outreach, Coordination and Communication	Department of Environmental Protection and Conservation
Roselyn Bue	Senior Officer: Chemicals & Ozone	Department of Environmental Protection and Conservation
Toney Tevi	Oceans Affairs	Department of Foreign Affairs
Trinison Tari	Principal Officer: Provincial Outreach, Information and Communication/SOE Local Coordinator	Department of Environmental Protection and Conservation
Vani Koroisamanunu	Environmental GIS Specialist	Secretariat of the Pacific Regional Environment Program

ANNEX 2 – MEAs Reporting

CONVENTION	REPORTING REQUIREMENTS	DEPARTMENT RESPONSIBLE	STATUS OF REPORTING	REPORT UP-TO-DATE (Y/N)
Noumea Convention (SPREP Agreement)	No reporting requirement	DEPC; DPFA	Necessary updates provided or submitted to SPREP's annual general meetings	YES
Agreement on the International Dolphin Conservation Program 1998 (the La Jolla Agreement)		Vanuatu Fisheries Department	As of 1st June 2019, Vanuatu is applying the Agreement provisionally.	NO
Convention on Biological Diversity	NBSAPs National Reports	DEPC	Vanuatu NBSAP (2018 – 2030) submitted in 2018 6NR was due 31 December 2020. Completed. Submitted before CBD CoP15 in October 2020	YES
Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation to the Convention on Biological Diversity (Nagoya Protocol)	Interim National Reports on the Implementation of the Nagoya Protocol	DEPC	National Interim Report submitted	YES
CITES	Annual report on CITES trade (permits granted, etc.) Annual illegal trade report (seizures, etc.) Implementation report (biennial, on legislative, regulatory, and administrative measures taken to enforce the convention) Ad hoc reports can also be requested	Biosecurity Vanuatu	Designation of an Official IPPC Contact Point updated Description of NPPO submitted in 2005 1 Pest report submitted in 2005	YES
International Plant Protection Convention (IPPC)				YES
Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Island Region	National Report	Vanuatu Fisheries Department	No report submitted	NO

CONVENTION	REPORTING REQUIREMENTS	DEPARTMENT RESPONSIBLE	STATUS OF REPORTING	REPORT UP-TO-DATE (Y/N)
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range	National Reports	Vanuatu Fisheries Department	National Report was submitted in 2017	YES
Memorandum of Understanding on the Conservation of Migratory Sharks	National Reports	Vanuatu Fisheries Department	National Report was submitted in 2018	YES
Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat Technical Reports	National Report on the implementation of the Convention	Department of Environmental Protection and Conservation		NO
UNCCD	National Reporting – data on progress towards five strategic objectives, and narratives on actual implementation efforts every four years (since 2018 – previous reporting cycle was 2 years and was changed to every 4 years as per decision from COP13 in 2017)	Department of Environmental Protection and Conservation	3rd National Report was submitted in 2007. Next report to be submitted in 2022	NO
United Nations Framework Convention on Climate Change	National Communication Report Annual Report	Department of Climate Change	3rd National Communication Report submitted 1st Nationally Determined Contribution Report submitted in 2016, however report was updated in 2021	YES
Kyoto Protocol	Annual Greenhouse gas inventory National communications including supplementary information to demonstrate compliance with the Protocol	Department of Climate Change, Department of Foreign Affairs	3rd National Communications submitted. Vanuatu up to date with reporting obligations.	YES

CONVENTION	REPORTING REQUIREMENTS	DEPARTMENT RESPONSIBLE	STATUS OF REPORTING	REPORT UP-TO-DATE (Y/N)
Vienna Convention	Submit a summary every two years of the measures adopted by the Party for implementation of the Convention	DEPC	Annual reports submitted to the UN Ozone Secretariat annually (Latest report submitted in 2020)	YES
Montreal Protocol	Annual statistical data about Ozone Depleting Substances (ODS) to the Ozone Secretariat (and other data) – used by the Sec to calculate each Party's ODS consumption and production figures	DEPC	No overdue reports	YES
Stockholm Convention	National Implementation Plans National reports every four years – statistical data on production, import, and export of relevant chemicals, and States imported from and exported to	DEPC	National Implementation Plan recently submitted Vanuatu still to produce its national report	NO
International Convention for the Prevention of Pollution from Ships (MARPOL)	Incident Reports, Oil spill report	Department of Ports and Marine	No report submitted	NO
Minamata Convention	Minamata Convention on Mercury – Vanuatu has acceded to the convention, and I think there is a report that we need to submit at the end of this year.	DEPC	First national short report submitted in 2019. (1st full national report due by 31st December 2021)	YES
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)	National Report	DEPC	National Report yet to be submitted	NO
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	National Report	DEPC	National Report yet to be submitted	NO

CONVENTION	REPORTING REQUIREMENTS	DEPARTMENT RESPONSIBLE	STATUS OF REPORTING	REPORT UP-TO-DATE (Y/N)
Waigani Convention	Notification of transboundary movement of waste Report confirmed illegal traffic of waste	DEPC	No report submitted yet	NO
Convention Concerning the Protection of the World Cultural and Natural Heritage	Periodic reporting on the implementation of the Convention	Vanuatu Cultural Centre	No report submitted yet	NO
Convention for the Safeguarding of the Intangible Cultural Heritage	Periodic reporting on the implementation of the Convention	Ministry of Education and Training	Reporting overdue (to be submitted in 2016 however, to be submitted by December 2021)	NO

ANNEX 3 – Languages of Vanuatu

LANGUAGE (OTHER NAMES)	ESTIMATED # SPEAKERS	REGION
Hiw (Hiu)	280	Torres Island (Hiw)
Lo-Toga (Loh, Toga)	580	Torres Islands (Lo, Toga, Tegua)
Lehali	200	Banks Islands (Ureparapara)
Loyop (Lehalurup)	240	Banks Islands (Ureparapara)
Mwotlav (Motlav)	2100	Banks Islands (Motalava)
Volow (Valuwa)	1	Banks Islands (Motalava)
Mota	750	Banks Islands (Mota)
Lemerig (Sasar)	2	Banks Islands (Vanua Lava)
Vera'a (Vatrata)	500	Banks Islands (Vanua Lava)
Vurës (Vureas, Mosina)	2000	Banks Islands (Vanua Lava)
Mwesen (Mosina)	10	Banks Islands (Vanua Lava)
Nume (Tarasag)	700	Banks Islands (Gaua)
Dorig (Wetamut)	300	Banks Islands (Gaua)
Koro	250	Banks Islands (Gaua)
Olrat	3	Banks Islands (Gaua)
Lakon (Lakona, Vure)	800	Banks Islands (Gaua)
Mwelap (Merlav)	1100	Banks Islands (Merelava)
Sungwadia (Marino, North Maewo)	500	Maewo
Tamambo	4000	Santos (Malo)
Tutuba	500	Santos
Mafea	250	Santos
Shark Bay	800	Santos
Sakao	4000	Santos
Tolomako	900	Santos
Cape Cumberland	2400	
- Vunapu		
- Piamatisna		
- Valpei		
- Nokuku		
- Tasmate		Santos
Wusi	300	Santos
Southwest Santo	4000	
- Akei		
- Wailapa		
- Tangoa		
- Araki		Santos
Central Santo	1400	
- Merei-Tiale		
- Okula		
- Navele		
- Tiai		Santos
Mores	75	Santos

LANGUAGE (OTHER NAMES)	ESTIMATED # SPEAKERS	REGION
Kiai	450	Santos
South-central Santo	2200	
- Morouas		
- Amblong		
- Narango		Santos
Southeast Santo	1000	
- Butmas-Tur		
- Polonombauk		
- Tambotalo		
		Santos
Duidui (Nduindui)	8700	Ambae
Northeast Ambae	5000	Ambae
Sunwadia	650	Maewo
Sunwadaga	1400	Maewo
Baetora	1330	Maewo
Raga	6500	Pentecost
Apma	7800	Pentecost
Seke	600	Pentecost
Sa	2500	Pentecost
Lendamboi	800	Malakula
Ninde	1100	Malakula
Sinesip	600	Malakula
Naha'ai	1100	Malakula
Nasvang	275	Malakula
Axamb	750	Malakula
Avok	500	Malakula
Maskelynes	1100	Malakula
Port Sandwich	1200	Malakula
Nisvai	100	Malakula
Banam Bay	900	Malakula
Aulua	750	Malakula
Unua-Pangkumu	800	Malakula
Navava	675	Malakula
Newwevwer	11250	Malakula
Dirak	900	Malakula
Northeast Malakula	9000	
- Atchin		
- Uripiv		
- Wala-Rano		Malakula
Vao	1900	Malakula
Mpotovoro	430	Malakula
Vovo	475	Malakula
Malua Bay	500	Malakula
V'enen Taut	3350	Malakula

LANGUAGE (OTHER NAMES)	ESTIMATED # SPEAKERS	REGION
Larevat	675	Malakula
Neve'ei	750	Malakula
Nasarian	Extinct	Malakula
Aveteian	Extinct	Malakula
Nati	25	Malakula (Malfaxal and Nahati)
Navwien	5	Malakula (Nati)
Sorsorian	4	Malakula (interior near Natanggan)
Mbwenelang	5	Malakula (speakers migrated to Aulua)
Surua Hole	Rare	Malakula (Aulua)
Bangsa	Moribund	Malakula (Levarmas peak bordering Nivat and Niviar)
Umbrul	2	Malakula (south of Tisvel River)
Niviar	2 (Moribund)	Malakula (Nurumbat River)
Nivat	Moribund	Malakula (western slopes of Levarmas peak)
Naman	Moribund	Malakula (Lambumbu River)
Lombal		Malakula
Tape		Malakula
Matanvat		Malakula
Southeast Ambrym	3000	Ambrym
South Ambrym	2500	
- Dakaka		
- Port Vato		Ambrym
West Ambrym	1200	Ambrym
North Ambrym	5250	Ambrym
Orkon	Moribund	Ambrym
Paamese		
Lewo	2200	Epi
Lamen	850	Epi
Beirebo	800	Epi
Baki	350	Epi
Mkir	175	Epi
Bieria		Epi (Vovo)
Ianigi		Epi (Puruvanua)
Iakanaga		Epi (Purupwe)
Livara		Epi
Revaliu		Epi
Ifira-Mele	3500	Efate
South Efate	6000	Efate
Nakanamanga	9500	Efate (Paunangisu, Emoa, Siviri, Moso, Pwele, Nugna and Emau)
Namakir	3750	Efate (Tongoa, Emae, Mataso, Buninga, Tongariki, Makira)
Emae	400	Efate (Emae – Makatea, Tongamea)
Erromangan		Erromango

LANGUAGE (OTHER NAMES)	ESTIMATED # SPEAKERS	REGION
Ura	Moribund	Erromango
Utaha	Moribund	Erromango
North Tanna	5000	Tanna
Lenakel	11500	Tanna
Whitesands	7500	Tanna
Southwest Tanna	5000	Tanna
Kwamera	3500	Tanna
Futuna-Aniwa		Futuna
Anejom		Aneityum

The above information taken from Lynch and Crowley, 2001.

ANNEX 4 – Resident Land Bird Species of Vanuatu

FAMILY/ENGLISH NAME	SPECIES	IUCN RED LIST
Common Mynah [not native]	<i>Acridotheres tristis</i>	Least Concern
White-rumped Swiftlet	<i>Aerodramus spodiopygius</i>	Least Concern
Uniform Swiftlet	<i>Aerodramus vanikorensis</i>	Least Concern
Rusty-winged Starling	<i>Aplonis zelandica</i>	Near Threatened
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	Least Concern
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	Least Concern
Pacific Emerald Dove	<i>Chalcophaps longirostris sandwichensis</i>	Least Concern
Palm Lorikeet	<i>Charmosyna palmarum</i>	Vulnerable
Swamp Harrier	<i>Circus approximans</i>	Least Concern
Southern Shrikebill	<i>Clytorhynchus pachycephaloides griseus</i>	Least Concern
Glossy Swiftlet	<i>Collocalia esculenta uropygialis</i>	Not Assessed
Rock Pigeon [not native]	<i>Columba livia</i>	Least Concern
Metallic Pigeon	<i>Columba vitiensis</i>	Least Concern
South Melanesian Cuckooshrike	<i>Coracina caledonica</i>	Least Concern
Baker's Imperial-Pigeon	<i>Ducula bakeri</i>	Least Concern
Pacific Imperial-Pigeon	<i>Ducula pacifica</i>	Least Concern
Pacific Reef-Heron	<i>Egretta sacra</i>	Least Concern
Red-headed Parrotfinch	<i>Erythrura cyaneovirens</i>	Near Threatened
Royal Parrotfinch	<i>Erythrura regia regia</i>	Not Assessed
Blue-faced Parrotfinch	<i>Erythrura trichroa</i>	Least Concern
Common Waxbill [not native]	<i>Estrilda astrild</i>	Least Concern
Peregrine Falcon	<i>Falco peregrinus</i>	Least Concern
Buff-banded Rail	<i>Gallirallus philippensis</i>	Least Concern
Red Junglefowl [not native]	<i>Gallus gallus</i>	Least Concern
Fan-tailed Gerygone	<i>Gerygone flavolateralis corraeae</i>	Least Concern
Vanuatu Honeyeater	<i>Gliciphila notabilis notabilis</i>	Not assessed
Vanuatu Honeyeater	<i>Gliciphila notabilis supercilialis</i>	Not Assessed
Pacific Swallow	<i>Hirundo tahitica</i>	Least Concern
Long-tailed Triller	<i>Lalage leucopyga</i>	Least Concern
Polynesian Triller	<i>Lalage maculosa</i>	Least Concern
Dark-brown Honeyeater	<i>Lichmera incana griseoviridis</i>	Not Assessed
Chestnut Munia [not native]	<i>Lonchura atricapilla</i>	Least Concern
Mackinlay's Cuckoo-Dove	<i>Macropygia mackinlayi</i>	Least Concern
Vanuatu Scrubfowl	<i>Megapodius layardi</i>	Vulnerable
Melanesian Flycatcher	<i>Myiagra caledonica marinae</i>	Not Assessed
Cardinal Myzomela	<i>Myzomela cardinalis</i>	Least Concern
Buff-bellied Monarch	<i>Neolalage banksiana</i>	Least Concern
Vanuatu Whistler	<i>Pachycephala chlorura intacta</i>	Not Assessed

FAMILY/ENGLISH NAME	SPECIES	IUCN RED LIST
House Sparrow [not native]	<i>Passer domesticus</i>	Least Concern
Ambryn's Robin	<i>Petroica multicolor ambryensis</i>	Not Assessed
Pacific Robin	<i>Petroica multicolor feminina</i>	Not Assessed
Soror's Robin	<i>Petroica multicolor soror</i>	Not Assessed
White-tailed Tropicbird	<i>Phaethon lepturus</i>	Least Concern
Pacific Golden-Plover	<i>Pluvialis fulva</i>	Least Concern
Red-bellied Fruit-Dove	<i>Ptilinopus greyi</i>	Least Concern
Tanna Fruit-Dove	<i>Ptilinopus tannensis</i>	Least Concern
Gray Fantail	<i>Rhipidura albiscapa brenchleyi</i>	Not Assessed
Streaked Fantail	<i>Rhipidura verreauxi spilodera</i>	Not Assessed
Great Crested Tern	<i>Thalasseus bergii</i>	Least Concern
Vanuatu Kingfisher	<i>Todiramphus farquhari</i>	Near Threatened
Pacific Kingfisher	<i>Todiramphus sacer juliae</i>	Not Assessed
Santo's Kingfisher	<i>Todiramphus sacer santoensis</i>	Not Assessed
Rainbow Lorikeet	<i>Trichoglossus haematodus massena</i>	Least Concern
Wandering Tattler	<i>Tringa incana</i>	Least Concern
Efate Thrush	<i>Turdus poliocephalus efatensis</i>	Least Concern
Malekula Island Thrush	<i>Turdus poliocephalus malekulae</i>	Least Concern
Island Thrush	<i>Turdus poliocephalus placens</i>	Least Concern
Island Thrush	<i>Turdus poliocephalus whitneyi</i>	Least Concern
Barn Owl	<i>Tyto alba</i>	Least Concern
Efate White-eye	<i>Zosterops flavifrons efatensis</i>	Least Concern
Gaua Silver-eye	<i>Zosterops flavifrons gauensis</i>	Least Concern
Silver-eye	<i>Zosterops flavifrons macgillivrayi</i>	Least Concern
Silver-eye	<i>Zosterops flavifrons perplexa</i>	Least Concern
Silver-eye	<i>Zosterops lateralis</i>	Least Concern

ANNEX 5 – Vanuatu's Endangered Species

SPECIES	COMMON NAME	TAXONOMIC GROUP
<i>Agathis macrophylla</i>	Pacific kauri	Plant
<i>Alopecoenas sanctaerucis</i>	Santa Cruz ground dove	Bird
<i>Alopias pelagicus</i>	Pelagic thresher shark	Shark
<i>Aplonis santovestris</i>	Mountain starling	Bird
<i>Balaenoptera musculus</i>	Blue whale	Whale
<i>Brachylophus bulabula</i>	Fiji banded iguana	Reptile
<i>Carcharhinus amblyrhynchos</i>	Grey reef shark	Shark
<i>Cetorhinus maximus</i>	Basking shark	Shark
<i>Chaerephon bregullae</i>	Fijian mastiff bat	Bat
<i>Cheilinus undulatus</i>	Humphead wrass	Fish
<i>Chelonia mydas</i>	Green sea turtle	Turtle
<i>Cyphosperma voutmelense</i>	Voutmele palm	Palm
<i>Emballonura semicaudata</i>	Pacific sheath-tailed bat	Bat
<i>Emoia aneityumensis</i>	Aneityum skink	Reptile
<i>Holothuria lessoni</i>	Golden sandfish	Holothuria
<i>Holothuria nobilis</i>	Black teatfish	Holothuria
<i>Holothuria scabra</i>	Sandfish	Holothuria
<i>Holothuria whitmaei</i>	Black teatfish	Holothuria
<i>Isurus oxyrinchus</i>	Shortfin mako	Shark
<i>Isurus paucus</i>	Longfin mako	Shark
<i>Mobula birostris</i>	Giant oceanic manta ray	Ray
<i>Mobula mobular</i>	Giant devil ray	Ray
<i>Mobula tarapacana</i>	Chilean devil ray	Ray
<i>Mobula thurstoni</i>	Bentfin devil ray	Ray
<i>Negaprion acutidens</i>	Sicklefin lemon shark	Shark
<i>Nesofregetta fuliginosa</i>	Polynesian storm petrel	Bird
<i>Ouagapia perryi</i>	Perry's snail	Snail
<i>Partula aurantiana</i>	Snail	Snail
<i>Plerandra cabalionii</i>	Aralia	Plant
<i>Pterocarpus indicus</i>	Amonyna wood	Tree
<i>Pteropus fundatus</i>	Banks flying fox	Bat
<i>Rhincodon typus</i>	Whale shark	Shark
<i>Thelenota ananas</i>	Prickly red fish	holothuria
<i>Veitchia montgomeryana</i>	Montgomery's palm	Palm

ANNEX 6 – Vanuatu's Vulnerable Species

SPECIES	NOTES
<i>Acanthastrea bowerbanki</i>	Coral
<i>Acanthastrea ishigakiensis</i>	Coral
<i>Acropora aculeus</i>	Coral
<i>Acropora acuminata</i>	Coral
<i>Acropora anthocercis</i>	Coral
<i>Acropora aspera</i>	Coral
<i>Acropora caroliniana</i>	Coral
<i>Acropora dendrum</i>	Coral
<i>Acropora donei</i>	Coral
<i>Acropora echinata</i>	Coral
<i>Acropora globiceps</i>	Coral
<i>Acropora horrida</i>	Coral
<i>Acropora kirstyae</i>	Coral
<i>Acropora listeri</i>	Coral
<i>Acropora lovelli</i>	Coral
<i>Acropora microclados</i>	Coral
<i>Acropora palmerae</i>	Coral
<i>Acropora paniculata</i>	Coral
<i>Acropora polystoma</i>	Coral
<i>Acropora solitaryensis</i>	Coral
<i>Acropora speciosa</i>	Coral
<i>Acropora spicifera</i>	Coral
<i>Acropora tenella</i>	Coral
<i>Acropora vauhani</i>	Coral
<i>Acropora verweyi</i>	Coral
<i>Actinopyga echinites</i>	Deep water redfish
<i>Actinopyga mauritiana</i>	Surf redfish
<i>Actinopyga miliaris</i>	Hairy blackfish
<i>Aglaia saltatorum</i>	Plant
<i>Alopias superciliosus</i>	Bigeye thresher shark
<i>Alopias vulpinus</i>	Common thresher shark
<i>Alveopora allingi</i>	Coral
<i>Alveopora fenestrata</i>	Coral
<i>Alveopora marionensis</i>	Coral
<i>Alveopora verrilliana</i>	Coral
<i>Amblyglyphidodon ternatensis</i>	Yellow staghorn damselfish
<i>Anacropora puertogalerae</i>	Coral
<i>Anacropora reticulata</i>	Coral
<i>Ardenna bulleri</i>	Buller's shearwater
<i>Astreopora cucullata</i>	Coral
<i>Barabattoia laddi</i>	Coral
<i>Birgus latro</i>	Coconut crab

SPECIES	NOTES
<i>Bolbometopon muricatum</i>	Humphead parrotfish
<i>Carcharhinus melanopterus</i>	Blacktip reef shark
<i>Carcharodon carcharias</i>	Great white shark
<i>Catalaphyllia jardinei</i>	Coral
<i>Caulastrea curvata</i>	Coral
<i>Charmosyna palmarum</i>	Palm lorikeet (endemic to Vanuatu and Solomon Islands)
<i>Cycas seemannii</i>	Cycad (native to Fiji, Tonga, New Caledonia and Vanuatu)
<i>Cyphastrea ocellina</i>	Coral
<i>Deania quadrispinosa</i>	Longsnout dogfish
<i>Dugong dugon</i>	Dugong
<i>Emoia erronan</i>	Skink
<i>Endospermum medullosum</i>	Whitewood
<i>Epinephelus fuscoguttatus</i>	Brown-marbled grouper
<i>Epinephelus polyphemus</i>	Camouflage grouper
<i>Euphyllia cristata</i>	Coral
<i>Euphyllia paraancora</i>	Coral
<i>Favia rosaria</i>	Coral
<i>Galaxea acribia</i>	Coral
<i>Galaxea astreata</i>	Coral
<i>Gehyra georgopotthasti</i>	Web-toed gecko
<i>Gobiodon axillaris</i>	Red-striped Coralgoby
<i>Heliofungia actiniformis</i>	Coral
<i>Heliopora coerulea</i>	Coral
<i>Hippocampus kelloggi</i>	Great seahorse
<i>Holothuria fuscogilva</i>	White teatfish
<i>Isopora cuneata</i>	Coral
<i>Leptoseris incrustans</i>	Coral
<i>Leptoseris yabei</i>	Coral
<i>Lobophyllia diminuta</i>	Coral
<i>Makaira nigricans</i>	Atlantic blue marlin
<i>Megapodius layardi</i>	Vanuatu megapode (endemic)
<i>Mobula alfredi</i>	Reef Manta ray
<i>Mola mola</i>	Ocean sunfish
<i>Montastrea multipunctata</i>	Coral
<i>Montastrea salebrosa</i>	Coral
<i>Montipora altasepta</i>	Coral
<i>Montipora australiensis</i>	Coral
<i>Montipora caliculata</i>	Coral
<i>Montipora capricornis</i>	Coral
<i>Montipora cebuensis</i>	Coral
<i>Montipora cocosensis</i>	Coral
<i>Montipora corbettensis</i>	Coral
<i>Montipora crassituberculata</i>	Coral

SPECIES	NOTES
Montipora samarensis	Coral
Montipora turtlensis	Coral
Nebrius ferrugineus	Tawny nurse shark
Notopteris macdonaldi	Long-tailed fruit bat (endemic to Fiji and Vanuatu)
Oxymonacanthus longirostris	Orange spotted filefish
Pachyseris rugosa	Coral
Palaquium neobudicum	Plant (endemic)
Pandanus halleorum	Pandanus (endemic)
Pastinachus ater	Cowtail stingray
Pavona bipartita	Coral
Pavona cactus	Coral
Pavona decussata	Coral
Pavona venosa	Coral
Pectinia alcornis	Coral
Pectinia lactuca	Coral
Physeter macrocephalus	Sperm whale
Physogyra lichtensteini	Coral
Plectropomus areolatus	Squaretail coral grouper
Pocillopora danae	Coral
Porites attenuata	Coral
Porites horizontalata	Coral
Porites nigrescens	Coral
Pterodroma brevipes	Collared petrel
Pterodroma cervicalis	White-necked petrel
Pterodroma leucoptera	Gould's petrel
Pterodroma pycrofti	Pycroft's petrel
Pterodroma solandri	Providence petrel
Pteropus anetianus	Vanuatu Flying fox (endemic)
Seriatopora aculeata	Coral
Stichopus herrmanni	Hermann's sea cucumber
Syzygium insulare	Plant – local name Nepkrera (Malakula)
Taeniurops meyeri	Round ribbontail ray
Thunnus obesus	Bigeye tuna
Triaenodon obesus	Whitetip reef shark
Tridacna gigas	Giant clam
Turbinaria bifrons	Coral
Turbinaria mesenterina	Coral
Turbinaria patula	Coral
Turbinaria peltata	Coral
Turbinaria reniformis	Coral
Turbinaria stellulata	Coral
Urogymnus asperrimus	Porcupine ray

ANNEX 7 – Tabu, Protected and Community Conservation Areas

PROTECTED AREAS	LAND/MARINE	NOTES
Amal Crab Bay Community Conservation Area	Land/Marine	
Ambrym Megapode Reserve	Land	
Aore Recreational Reserve	Marine	0.37 km ² . Aore Island. Designated as a Recreational Reserve in 1984.
Apuma Community Conservation Area	Marine	Lelepa. Established in 2018
Batnatamp	Marine	Malekula Is. Malampa. Established 2018.
Benour	Land	Malekula Is. Malampa. Established 2018.
Bucaro Aore Recreational Reserve	Land/Marine	0.2 km ² . Designated in 1984. Aore Island.
Central Efate (Teouma)	Land	
Dolav Community Conservation Area	Land	Gaua Island.
Eastern Tabu Area	Marine	Aniwa Is. Tafea Province. Established 2016.
Edenhope Nature Reserve	Land	7.86 km ² . Santo. Private. Designated in 2004.
Emua Protected Area	Land/Marine	Efate. Emua & Saama Village. Tabu on reef. Established in 1995.
Epao Marine Protected Area	Marine	Efate. 0.18 km ² . Not registered.
Erakor and Empten Lagoon	Marine	Efate. Erakor Village. Tabu on harvesting marine resources. Established in 1997.
Erromango Kauri	Land	32.07 km ² . Tafea Province. A Key Biodiversity Area. Designated as a conservation Area in 1995. Erromango Is.
Hideaway Island	Marine	Efate. Mele Village. Trochus stocking and marine reserve. Established in 1996.
Hiu Island Reserve	Marine	Hiu Island.
Hog Harbour Community Conservation Area	Marine	Santo (marine). To be registered
Hog Harbour Marine Conservation Area	Marine	Santo. Sanma Province. Established in 2017.
Homo Bay Community Conservation Area	Land/Marine	38.15 km ² . Pentecost Is. Penama Province. Designated as a Conservation Area in 2017. A Key Biodiversity Area.
Kauri Reserve Community Conservation Areas	Land	Santo. Established 1995.
Labo	Marine	Malekula Is. Malampa. Established 2018.
Lake Letas Community Conservation Area	Lake	51.12 km ² . Gaua Is. To be registered
Lakorombanga Protected Area	Marine?	
Lamango	Marine	Malekula Is. Malampa. Established 2018.
Lampitet	?	Malekula Is. Malampa. Established 2018.
Lasenuwi Conservation Area	Marine	Malekula Is. Malampa.
Lekavik Protected Area	Marine	Lebwibwi Village. Tak tabu on marine area. Established in 1998.
Loh Island Reserve	Marine	Loh Island
Lohbakalo	Marine	Malekula Is. Malampa. Established 2018.
Lolathe Marine Conservation Area	Marine	Santo. Sanma Province. Established in 2017.
Loru Community Conservation Area	Land/Marine	Khole Village. Santo. Sanma Province. A Key Biodiversity Area. Established in 1994; Declared in 2015. Protect forest and marine resources.

PROTECTED AREAS	LAND/MARINE	NOTES
Lownahuru Protected Area	Land	
Lutes	Marine	Uluveo, Maskelynes. Malampa Province. Established in 2017
Malakloplop Community Conservation Area	Land	Gaua Is. Established in 2019
Mangalilu	Marine	Mangaliliu Village. Protect Marine Resources. Established in 1995.
Mt Tabueamasana Community Conservation Area	Land	Highest mountain. Santo.
Mystery Island Reserve	Marine	Aneityum Island. Established in 1995 and registered in 2017.
Nagha mo Pinela Protected Area	Marine/Land	Wiawi Village. Marine and forest conservation. Established in 1994.
Naonebaravu-Malo Marine Reserve	Marine	0.11 km ² . Established in 1984. Malo Island.
Narong Marine Protected Area	Marine	Malekula Is. Selanamboro Village. Protect marine nursery area. Established in 1992.
Nevnal Protected Area	Marine	Leviamp Village. Conserve marine and forest areas. Established in 1995.
Nguna Pele Protected Areas (Nguan Pele Marine Reserve)	Marine	About 7 marine protected areas around Nguna and Pele islands. All designated as an IUCN Protected Area Category VI. A total of 30 km ² of marine areas under conservation. Established in 2001.
Pankumo Protected Area	Marine	Designated as a Conservation Area. Malekula
Pellongk	Marine	Uluveo, Maskelynes. Malampa Province. Established in 2017
Penaoru Community Conservation Area	Land/Marine	30 km ² . Designated as a conservation area in 2005. Santo Island.
Peskarus	Marine	Uluveo, Maskelynes. Malampa Province. Established in 2017
Port Olry Community Conservation Area	Marine	Santo. To be registered
Port Olry MPA	Marine	Santo. Sanma Province. Established in 2017.
Port Patrick	Marine.	Aneityum Is. Declared under the Fisheries Regulation Order No. 28 of 2009
Rautem	Marine	Malekula Is. Malampa Province. Established 2018.
Ringi te Suh Extension Reserve	Marine	Malekula Is. Malampa Province. Pelongk Village. A Key Biodiversity Area. Established 1991. Conserve marine resources.
Roimata Domain World Heritage Site	Island	World Heritage Site. 53.8 km ² . UNESCO site. Established 2008.
Spuaki Conservation Area	Marine	Nguna is. Established in 1998.
Tabwemasana Community Conservation Area	Land?	Santo Is. Established in 2018
Tegua Island Reserve	Marine	Tegua Is.
Unnamed 1		Epi Island. Shefa province. Established 2016.
Unnamed 2		Epi Island. Shefa province. Established 2016.
Unnamed 3		Epi Island. Shefa province. Established 2016.
Unnamed 4		Epi Island. Shefa province. Established 2016.
Unnamed 5		Epi Island. Shefa province. Established 2016.

PROTECTED AREAS	LAND/MARINE	NOTES
Unnamed 6		Epi Island. Shefa province. Established 2016.
Unnamed 7		Epi Island. Shefa province. Established 2016.
Unnamed 8		Erromango Is. Tafea Province. Established 2017.
Uri Marine Park	Marine	Uri Is.
Vatthe Community Conservation Area	Land/Marine	34.7 km ² . IUCN Category VI. Designated in 1994. Santo Island. Sanma Province. A Key Biodiversity Area.
Vendik Protected Area	?	
Vendikdik	?	Malekula Is. Malampa. Established 2018.
Vetyayah	Marine	Mota Lava, Torba Province. Established in 2014.
Wairua Community Conservation Area	Marine	Gaua Is. Established in 2019
Western Peninsular	?	
Western Tabu Area	Marine	Aniwa Is. Tafea Province. Established 2016.
Whitesands Reserve	Marine	Efate Is. 0.39 km ² Established 1984. Tanna.
Wiawi Conservation Area	Land/Marine	Malekula Is. Malampa Province. A Key Biodiversity Area. Established 1991.
Yapinobong	Marine	Malekula Is. Malampa. Established 2018.
President Coolidge and Million Dollar Point	Marine	Shipwreck and surrounding areas. 1 km ² . IUCN Management Category III – Status Year 1983. Santo. War grave and dive site.

National Conservation Area Registry @ DEPC 2019; Whyte et al. 1998; Naviti and Aston 2000.

ANNEX 8 – Vanuatu Species of National Significance

Endangered, vulnerable, threatened, and rare

SCIENTIFIC NAME	COMMON NAME
PLANT SPECIES	
Agathis macrophyllum	Kauri
Agathis silbae	Kauri
Canarium harveyi	Nangae
Carpoxydon macrospermum	Palm
Caryota ophiopellis	Snakeskin Palm
Clinostigma harlandii	Palm
Cycas seemanii	Cycad
Cyphospasma voutmelensis	Palm
Gulubria cylindrocarpa	Palm
Heterospatha uniformis	Palm
Licuala caballionii	Palm
Metroxylon warburgii	Natangura
Neoveitchia brunnea	Palm
Orchidaceae spp.	Orchids
Pelagodoxa henryana	Palm
Physokentia tete	Palm
Santalum austrocaledonicum	Sandalwood
Veitchia montgomeryana	Palm
ANIMAL SPECIES	
Acropora sp./Porites sp. etc.	Coral Reef
Birgus latro	Coconut Crab
Bolbometopon muricatum	Bumphead Parrotfish
Brachylophus fasciatus	Banded Iguana
Cardisoma sp.	Land crabs
Charmosyna palmarum	Green Palm Lorikeet
Charonia tritonis	Bubu/Triton Shell
Chelonidae	All turtle species
Cheilinus undulatus	Humphead Wrasse
Crocodylus porosus	Saltwater crocodile
Ducula bakeri	Vanuatu Imperial Pigeon
Ducula pacifica	Pacific Imperial Pigeon
Dugon dugong	Dugong
Erythrura cyaneovirens	Royal Parrotfinch
Epinephelus lanceolatus	Giant Grouper/Los
Falco peregrinus	Peregrine Falcon
Gallicolumba sanctaecrucis	Santa Cruz Ground Dove
Holothuriidae	All Sea Cucumbers- Beche-de-mer
Macrobrachium sp.	Freshwater Prawns
Megapodius freycinet	Vanuatu Incubator Bird/Megapode
Odontoceti/Mysticeti	All Whales and Dolphins

Endangered, vulnerable, threatened, and rare

SCIENTIFIC NAME	COMMON NAME
Panulirus sp.	All Lobsters
Pomacanthidae /Acanthuridae/etc.	All Aquarium Fish
Pteropidae	All Flying Fox and Bat Species
Scylla sp.	Mud Crabs
Tridacna/Hippopus spp	All Giant Clams
Trochus niloticus	Trochus
Turbo marmoratus	Green Snail

Endemic

SCIENTIFIC NAME	COMMON NAME
PLANT SPECIES	
Agathis silbae	Kauri
Calamus vanuatuensis	Rattan
Callophyllum neo ebudica	Tamanu
Carpoxyton macrosporum	Palm
Caryota ophiopellis	Snakeskin Palm
Clinostigma harlandii	Palm
Cyphosperma voutmelense	Palm
Dioscorea hebridensis	Yam
Ficus granatum	Nabanga
Heterospatha uniformis	Palm
Licuala cabalionii	Palm
Macaranga megacarpa	Navenue
Neoveitchia brunnea	Palm
Orchidaceae spp.	Orchid
Physokentia tete	Palm
Veitchia spp.	Palm
ANIMAL SPECIES	
Akihito vanuatu	Freshwater Fish
Aplonis santovestris	Santo Mountain Starling
Cryptobhepharus novohebridicus	Beach Skink
Ducula bakeri	Vanuatu Imperial Pigeon
Emoia aneityumensis	Aneityum Skink
Emoia nigromarginata	Pentecost Green Skink
Emoia sanfordi	Vanuatu Skink
Emoia speiseri	Speiser's Skink
Erythrura regia	Royal Parrotfinch
Halcyon farquhari	Vanuatu Kingfisher
Macrobrachium sp.	Freshwater Prawn
Megapodius freycineti layardi	Vanuatu Incubator Bird/Megapode
Myeomeia cardinalensis	Vanuatu Honeyeater

Endemic

SCIENTIFIC NAME	COMMON NAME
<i>Sus scrofa</i>	Narave Pig
<i>Neolalage banksiana</i>	Vanuatu Fly Catcher/Buff-bellied Monarch
<i>Perochirus guentheri</i>	Saw-tailed Gecko
<i>Petula</i> sp.	Snail
<i>Phylidonyris notabilis</i>	Vanuatu Mountain Honeyeater
<i>Polyura sacco et al.</i>	Butterfly
<i>Pteropus anetianus</i>	White Flying Fox
<i>Pteropus fundatus</i>	Banks Flying Fox
<i>Ptilinopus tannensis</i>	Tanna Fruit Dove
<i>Schismatogobius vanuatuensis</i>	Freshwater Fish
<i>Sicyopterus aiensi</i>	Freshwater Fish
<i>Stiphodon kalfatak</i>	Freshwater Fish
<i>Vivineala pryhotigris</i> , sp.	Freshwater Fish
<i>Zosterops flavifrons</i>	Yellow White-Eye

The tables are not intended to report ALL species of national significance. Designations and status of biological species change regularly, and new species are discovered each year. There is likely to be more species to be added as new information comes to light.

ANNEX 9 – Vanuatu Freshwater Biodiversity fauna

COMMON NAME	SCIENTIFIC NAME	DISTRIBUTION	POPULATION STATUS
Green lace shrimp	<i>Atyoida pilipes</i>	Gaua, Santo, Ambae, Maewo, Pentecost, Epi, Malekula, Epi, Efate and Tanna	Common
Bamboo shrimp	<i>Atyoida spinipes</i>	Gaua, Santo, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Short carpus shrimp	<i>Caridina brevicarpalis</i>	Santo, Malekula, Epi and Efate	Common
Red nosed phantom shrimp	<i>Caridina gracilirostris</i>	Santo	Common
Guery's shrimp	<i>Caridina gueryi</i>	Santo and Pentecost	Common
Long nosed shrimp	<i>Caridina longirostris</i>	Gaua, Santo, Pentecost, Malekula, Epi and Efate	Common
Ninja shrimp	<i>Caridina serratirostris</i>	Santo, Pentecost, Ambae, Malekula and Efate	Common
Type shrimp	<i>Caridina typus</i>	Gaua, Santo, Ambae, Maewo, Pentecost, Malekula, Epi and Tanna	Common
Weber's shrimp	<i>Caridina weberi</i>	Gaua, Santo, Maewo, Pentecost, Malekula, Epi and Efate	Common
Mangrove prawn	<i>Palaemon concinnus</i>	Santo and Efate	Common
Feeble prawn	<i>Palaemon debilis</i>	Efate	Common
Noumea river prawn	<i>Macrobrachium aemulum</i>	Santo	Common
Koua river prawn	<i>Macrobrachium australe</i>	Gaua, Santo, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Berit river prawn	<i>Macrobrachium bariense</i>	Santo, Pentecost, Malekula, Epi and Efate	Common
Rough river prawn	<i>Macrobrachium equidens</i>	Santo	Common
Lollipop prawn	<i>Macrobrachium gracilirostre</i>	Gaua, Santo, Maewo, Pentecost, Malekula, Efate and Tanna	Common
Hawaiian river prawn	<i>Macrobrachium grandimanus</i>	Santo and Malekula	Common
Jaro river prawn	<i>Macrobrachium cf jaroense</i>	Pentecost and Malekula	Common
Giant jungle prawn	<i>Macrobrachium lar</i>	Gaua, Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Scissor river prawn	<i>Macrobrachium latidactylus</i>	Santo and Malekula	Common
Mountain river prawn	<i>Macrobrachium latimanus</i>	Santo, Ambae, Maewo, Pentecost, Malekula and Epi	Common
Cave prawn	<i>Macrobrachium microps</i>	Santo	Common

COMMON NAME	SCIENTIFIC NAME	DISTRIBUTION	POPULATION STATUS
Peaceful prawn	Macrobrachium placidulum	Gaua, Santo, Maewo, Pentecost, Malekula, Epi and Efate	Common
Hedgehog prawn	Macrobrachium spinosum	Gaua, Santo and Malekula	Common
Krab	Labuanium trapezoideum	Gaua and Santo	Common
Petit crabe	Ptychognathus pusillus	Gaua and Maewo	Common
Crab	Ptychognathus riedelii	Santo, Maewo, Pentecost, Malekula and Tanna	Common
Utica krab	Utica gracilipes	Santo, Malekula and Efate	Common
Crabe lisible krab	Varuna litterata	Gaua, Santo, Maewo, Pentecost, Malekula and Efate	Common
Giant mottled-eel	Anguilla marmorata	Hiu, Ureparapara, Gaua, Santo, Santo, Maewo, Pentecost, Malekula, Epi, Efate, Erromango, Tanna and Aneityum	Common
Polynesian longfinned eel	Anuilla megastoma	Ureparapara, Gaua, Santo and Malekula	Common
Pacific shortfinned-eel	Anguilla obscura	Santo and Aneityum	Common
Speckled longfin-eel	Anguilla reinhardtii	Gaua, Maewo and Malekula	Common
Lesser thrush-eel	Moringua microchir	Efate	Common
Oriental worm-eel	Lamnostoma orientalis	Santo, Pentecost and Malekula	Common
Freshwater snake-eel	Lamnostoma kampeni	Santo, Maewo, Pentecost, Malekula and Efate	Common
Ocellated sand-eel	Lamnostoma polyophthalma	Santo, Malekula and Pentecost	Common
Freshwater moray	Gymnothorax polyuranodon	Malekula, Epi, Efate and Erromango	Common
Guppy	Poecilia reticulata	Santo, Ambae, Maewo, Malekula, Efate and Tanna	Common
Mosquitofish	Gambusia affinis	Gaua, Vanua-Lava, Ambae, Maewo, Efate and Tanna	Common
Flat-nosed pipefish	Microphis argulus	Gaua, Malekula and Efate	Common
Short-tailed pipefish	Microphis brachyurus brachyurus	Santo and Malekula	Common
Barhead pipefish	Microphis leiaspis	Santo	Common
Menado pipefish	Microphis manadensis	Santo and Maewo	Common
Ragged-tail pipefish	Microphis retzii	Gaua, Santo, Maewo, Pentecost, Malekula, Efate and Tanna	Common
Spinach pipefish	Microphis spinachioides	Santo	Common
Wash fish	Tetraroge niger	Gaua, Santo, Pentecost, Malekula and Efate	Common
Lobed river mullet	Cestraeus plicatilis	Ureparapara, Santo, Pentecost, Malekula and Aneityum	Common

COMMON NAME	SCIENTIFIC NAME	DISTRIBUTION	POPULATION STATUS
Sharp-nosed river mullet	<i>Cestraeus oxyrhynchus</i>	Ureparapara, Santo, Pentecost, Malekula and Aneityum	Common
Fringelip mullet	<i>Crenimugil crenilabis</i>	Efate	Common
Flat-headed mullet	<i>Mugil cephalus</i>	Ureparapara, Gaua, Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Long-spined glass perchlet	<i>Ambassis interrupta</i>	Santo, Pentecost, Malekula and Epi	Common
Flag-tailed glass perchiet	<i>Ambassis miops</i>	Santo and Pentecost	Common
Dark-margined flagtail	<i>Kuhlia marginata</i>	Ureparapara, Gaua, Santo, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Silver flagtail	<i>Kuhlia munda</i>	Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate, Erromango and Tanna	Common
Barred flagtail	<i>Kuhlia mugil</i>	Efate	Common
Rock flagrail	<i>Kuhlia rupestris</i>	Ureparapara, Gaua, Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate, Erromango and Tanna	Common
Spotted scat	<i>Scatophagus argus</i>	Santo and Pentecost	Common
Tilapia	<i>Sarotherodon occidentalis</i>	Santo, Ambae, Maewo and Tanna	Common, Invasive
Beautiful hover goby	<i>Parioglossus formosus</i>	Santo and Malekula	Common
Taeniatus dartfish	<i>Parioglossus taeniatus</i>	Santo and Malekula	Common
Sand fish	<i>Gobitrichinotus radiocularis</i>	Santo	Common
Olive flathead-gudgeon	<i>Butis amboinensis</i>	Santo	Common
Throat-spine gudgeon	<i>Belobranchus belobranchus</i>	Gaua, Santo, Maewo, Pentecost, Malekula and Efate	Common
Greenback gauvina	<i>Bunaka gyrinoides</i>	Santo, Maewo and Pentecost	Common
Spinecheek gudgeon	<i>Eleotris acanthopoma</i>	Santo	Common
Broadhead sleeper	<i>Eleotris melanosoma</i>	Gaua, Santo, Malekula, Epi and Efate	Common
Broadhead sleeper	<i>Eleotris fusca</i>	Gaua, Vanua-Lava, Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Tropical carp gudgeon	<i>Hypseleotris cyprinoide</i>	Gaua, Santo, Malekula, Epi and Efate	Common
Snakehead gudgeon	<i>Ophieleotris aporos</i>	Gaua, Santo, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Eleotris serpent	<i>Ophieleotris</i> sp.	Gaua, Santo and Malekula	Common

COMMON NAME	SCIENTIFIC NAME	DISTRIBUTION	POPULATION STATUS
Northern mud gudgeon	Ophiocara porocephala	Vanua-Lava, Gaua, Santo, Malekula and Efate	Common
Scribbled boggy	Awaous guamensis	Pentecost and Aneithyum	Common
Gobie ocelle	Awaous ocellaris	Ureparaparap, Santo, Maewo, Pentecost, Malekula and Tanna	Common
Vanuatu's emperor	Akihito vanuatu	Ambae and Pentecost	Endemic, rare
Celebes goby	Glossogobius cf. celebius	Maewo, Santo, Malekula, Epi, Efate, Tanna and Aneityum	Common
Gobi millet	Mugilogobius mertonii	Santo and Malekula	Common
Gobi	Mugilogobius notospilus	Santo and Malekula	Common
Caledonian red-nose	Lentipes kaaea	Santo, Ambae, Maewo, Pentecost, Malekula and Epi	Common
Sleepy goby	Psammogobius biocellatus	Santo and Malekula	Common
Speckled goby	Redigobius bikolanus	Santo, Malekula and Efate	Common
Goby	Schismatogobius vanuatuensis	Gaua, Santo, Malekula, Pentecost, Epi and Efate	Common
Creek Ai's goby	Sicyopterus aiensis	Santo, Maewo, Pentecost, Malekula, Efate and Tanna	Endemic; Rare
Red-tailed goby	Sicyopterus lagocephalus	Gaua, Santo, Ambae, Maewo, Pentecost, Malekula, Epi, Efate and Tanna	Common
Chloe's sicyopus	Sicyopus (Smilosicyopus) chloe	Gaua, Santo and Malekula	Rare
Sicyopus (Smilosicyopus) sp.	Sicyopus (Smilosicyopus) sp.	Pentecost	Common
Bilitvat	Sicyopus zosterophorum	Santo and Malekula	Common
Yate's goby	Stenogobius yeteiensis	Gaua, Santo, Maewo, Pentecost, Malekula, Efate and Tanna	Common
Stiphodon incolore	Stiphodon astilbos	Santo, Pentecost and Efate	Common
Black stiphodon	Stiphodon atratus	Santo, Malekula, Pentecost and Efate	Common
Kalfatak's stiphodon	Stiphodon Kalfatak	Santo	Endemic; Rare
Mele's stiphodon	Stiphodon mele	Gaua, Santo, Pentecost and Efate	Common
Golden-red stiphodon	Stiphodon rutilaureus	Vanua-Lava, Gaua, Santo, Malekula, Ambae, Maewo, Pentecost, Efate, Erromango and Tanna	Common
Sapphire stiphodon	Stiphodon sapphirinus	Gaua, Santo, Maewo, Pentecost, Malekula and Efate	Common
Noreil	Rhyacichthys guilberti	Santo, Pentecost and Malekula	Common



2023

