

An Assessment of Vulnerable Sectors and EO Data Potential in Fiji

Climate Finance Landscape Report



The Commonwealth



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Abbreviations and Acronyms

ADB	Asian Development Bank
AF	Adaptation Fund
AFD	Agence Française de Développement
CCFAH	Commonwealth Climate Finance Access Hub
CCICD	Climate Change and International Cooperation Division
CCVA	Climate Change Vulnerability Assessment
CI	Conservation International
CIF	Climate Investment Funds
DAC	Development Assistance Committee
DFAT	Australian Department of Foreign Affairs and Trade
DRR	disaster risk reduction
EO	Earth Observation
EU	European Union
EWS	early warning system
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility
F\$	Fijian dollar
FMS	Fiji Meteorological Services
GCF	Green Climate Fund
GDP	gross domestic product
GEF	Global Environment Fund
GGF	Green Growth Framework
GGGI	Global Green Growth Institute
GHG	greenhouse gas
GIS	geographic information system
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoF	Government of Fiji
IFAD	International Fund for Agricultural Development
IPP	International Partnership Programme (of the UK Space Agency)
IRENA	International Renewable Energy Agency

IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
LEDS	Low Emission Development Strategy
M&E	monitoring and evaluation
MDB	multilateral development bank
MFAT	New Zealand Ministry of Foreign Affairs and Trade
MoHMS	Ministry of Health and Medical Services
MRV	monitoring, reporting and verification
NAP	National Adaptation Plan
NBSAP	National Biodiversity Strategy and Action Plan
NCCCC	National Climate Change Coordination Committee
NCCP	National Climate Change Policy
NDC	Nationally Determined Contribution
NDMO	National Disaster Management Office
NDP	National Development Plan
NDRRP	Fiji National Disaster Risk Reduction Policy
NTFP	non-timber forest products
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
PIC	Pacific island country
RE	renewable energy
REDD+	Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SIDS	small island developing states
SPC	The Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SRS	satellite remote sensing
TC	tropical cyclone
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
USAID	United States Agency for International Development
US\$	United States dollar
WB	World Bank
WHO	World Health Organization

Foreword

Pacific small island developing states (SIDS) states like Fiji are disproportionately affected by climate change, due to their unique geographical and socioeconomic characteristics that increase their vulnerability. The region is already experiencing the devastating impacts of climate change, including sea-level rise, lowland and coastal erosion, increased extreme weather events, drought, loss and damage of coastal infrastructure, and insecure food production. It is therefore important that Fiji and all Pacific island states take action to adapt and build resilience to the current and future impacts of climate change. It is in this regard that Pacific SIDS are leading the fight, setting ambitious mitigation and adaptation targets. To meet these priorities and targets, Pacific SIDS, including Fiji, require access to adequate financial and human resources to enhance the ability of key sectors to bear the brunt of climate change.

This report gives an overview of the climate finance landscape in Fiji, highlighting the funding gaps in priority sectors identified by Fiji and the potential to use Earth Observation data to support access to much-needed adaptation and mitigation finance for these sectors.

Earth Observation (EO) data and information have emerged as an important tool in supporting evidence-based decision-making, particularly for climate action, providing accurate, reliable and timely information on the status of many climatic and environmental parameters. The Commonwealth Secretariat, through the International Partnership Programme (IPP) CommonSensing Project, is driving and advocating for the increased use of EO data and information to strengthen the evidence base and climate rationale of funding applications.

The IPP CommonSensing Project¹ is an innovative partnership between the governments of Fiji, Solomon Islands and Vanuatu and a consortium of international partners.² It aims to provide actionable satellite-based information services and data around disaster and climate risks, to inform planning, climate action and increased access to climate finance. The Commonwealth Secretariat, through its flagship programme, the Commonwealth Climate Finance Access Hub (CCFAH), is spearheading the climate finance component of the CommonSensing Project. Through CCFAH Commonwealth National Climate Finance Advisers have been deployed for Fiji, Solomon Islands and Vanuatu and are providing technical assistance to the three countries to utilise the geospatial-based CommonSensing platform for enhanced access to climate finance.

The Climate Finance Landscape Report: An assessment of vulnerable sectors and EO data potential in Fiji therefore builds on the Commonwealth's body of work under the IPP CommonSensing Project to support Pacific SIDS to mobilise climate finance to convert their commitments and targets into action. By highlighting the key sectors that still require funding and by matching those against sectors with the highest potential for the application of EO data in climate finance applications, the Commonwealth Secretariat hopes to increase the use of such data and information in Fiji to push forward funding in these areas.

1 The IPP CommonSensing Project is generously funded by the UK Space Agency's International Partnership Programme (IPP) and the Global Challenges Research Fund (GCRF).

2 United Nations Institute for Training and Research (UNITAR - UNOSAT), Commonwealth Secretariat, Catapult Satellite Applications, Devex, Met Office, Sensonomic, Spatial Days and the University of Portsmouth.

We hope this resource makes a difference for Fiji and other partners to deliver the ambitious Nationally Determined Contribution (NDC) targets and aspirations of the islands' people.

Unnikrishnan Nair

Head of Climate Change
Economic, Youth and Sustainable Development Directorate
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Executive Summary

Pacific island countries (PICs) face serious threats from climate change, particularly due to increasingly severe extreme weather events, sea-level rise, and impacts on agricultural production. While PICs have extremely low per capita greenhouse gas emissions, governments from across the region have also prioritised the reduction of greenhouse gas emissions (GHGs) through their Nationally Determined Contribution (NDC), especially in relation to energy and transport sector targets.

Transitioning PICs to a low-carbon climate-resilient development pathway will require a wide array of adaptation and mitigation measures, strengthened institutional frameworks, and improved data collection and utilisation. Achieving these outcomes exceeds the financial capacity of most PICs, and the mobilisation of public and private sources of climate finance is therefore crucial for achieving climate change priorities, targets and commitments.

While there is a significant amount of funding available from dedicated climate funds, multilateral organisations, bilateral donors and other sources, PICs face challenges in accessing and deploying climate finance. Flows of climate finance need to be aligned with both the climate change and development goals of countries, to ensure that funding results in inclusive development outcomes and delivers strong environmental, social and economic co-benefits.

The objectives of this report are to identify the climate financing gaps, opportunities and barriers for Fiji. This report provides an overview of the baseline climate action needs of Fiji, highlighting the key vulnerable sectors and the related climate finance requirements, based on nationally agreed targets and ambitions.

The *Climate Finance Landscape Report: An assessment of vulnerable sectors and EO data potential in Fiji* has been published as part of the International Partnership Programme (IPP) CommonSensing Project, which is a partnership between Fiji, Solomon Islands and Vanuatu, and a consortium of international partners including the Commonwealth Secretariat, working together to support and build climate resilience and enhance decision-making, through the use of satellite remote sensing technology and by facilitating access to climate finance.

This report is aimed at informing the basis for future targeting of climate finance in line with the national and sectoral strategies and priorities, including the NDCs. It will also be used to guide the Commonwealth Secretariat's support under the IPP CommonSensing Project and beyond, on enhancing capacities to access climate finance and utilising Earth Observation (EO) data and information to strengthen the evidence base in climate finance applications.

The report is structured as follows:

- **Chapter 2: Review of national plans and strategies.** This chapter provides a summary of the key national and sectoral plans and strategies, identifying any key climate change priorities, targets or required actions for Fiji's development.
- **Chapter 3: Climate finance overview.** This chapter summarises the approximate amount of climate finance received by Fiji between 2016 and 2019, based on the *Fiji Climate Finance Snapshot* report.
- **Chapter 4: Data access and utilisation.** This chapter provides an overview of space applications and geospatial technology, and the potential of this data and information for strengthening the design, implementation and monitoring of climate change projects.
- **Chapter 5: Sector assessment.** This chapter discusses the status of climate finance utilisation in each sector/thematic area. The climate finance projects are qualitatively assessed in relation to the climate change-related national and sectoral plans, targets and goals. This chapter also discusses potential data utilisation and applications for enhancing climate financed projects in relation to each sector.
- **Chapter 6: Recommendations for attracting climate finance.** The final chapter puts forward a number of solutions and recommendations to strengthen access and deployment of climate finance. These recommendations are focused on institutional strengthening, capacity building and increasing technical capabilities, increasing information and data utilisation, increasing

access to finance, increasing involvement in private sector activities, and increasing wider stakeholder engagement.

Fiji has successfully developed and adopted a number of key national and strategic plans, which outline the country's progress, priorities and future activities for addressing climate change. Key plans and strategies are the National Adaptation Plan, Nationally Determined Contribution, Low Emissions Development Strategy and NDC Implementation Roadmap.

By reviewing the actions and priorities of climate-relevant plans and mapping these against the flows of climate finance received between 2016 and 2019 (based on the *Fiji Climate Finance Snapshot* report – the 'Snapshot Report'), climate financing gaps were identified. This Snapshot Report found that approximately 781 million Fiji Islands dollars (F\$) was spent annually over 2016–2019, through approximately 535 projects. Annual expenditure was found to be significantly less than the overall estimated F\$1.94 billion in domestic and international public climate finance allocated to Fiji annually for these projects between 2016 and 2019.³

In line with the priorities of the CommonSensing project, this report outlines the potential for satellite remote sensing (SRS) applications to help build climate resilience and enhance decision-making. This report outlines that with current technology, the potential for adopting SRS is high across most sectors; however, it may be more difficult to utilise SRS data for climate finance projects in the waste sector and biodiversity and the natural environment thematic area.

In Chapter 6, recommendations are suggested for strengthening Fiji's access to climate finance, building capacity, strengthening institutions and improving private sector engagement. At a high level these include:

- Clearly outlining the roles and responsibilities of stakeholders, and developing processes and incentives to ensure strengthened co-ordination and the collaboration (see section 6.1).

- Strengthening capacity and capabilities of government agencies to implement climate action, including through development of a training programme and the provision of long-term embedded models of technical assistance (see section 6.2).
- Improving the access and utilisation of information and data to improve project design, implementation, and monitoring and evaluation of climate change activities. These recommendations have a strong focus on the use of SRS data (see section 6.3).
- Strengthening policies, regulations and plans – including by ensuring actions are costed, responsibilities for implementation are defined and financing is identified for implementation (see section 6.4).
- Overcoming climate finance barriers and mobilising climate finance flows in order to meet current and future needs, particularly with increasing climate change and natural disaster risks. This will require expanded financial instruments and modalities, and strengthened capacity and co-ordination to develop funding proposals (see section 6.5).
- Strengthening private sector engagement, by building awareness and knowledge of opportunities, providing support on accessing climate finance, and providing an environment to enable increased flows of private investment (see section 6.6).
- Improving stakeholder engagement to achieve climate action, which includes engaging with line ministries, provincial administrations, communities, non-governmental organisations (NGOs) and the private sector (see section 6.7).

The results of the climate finance sector-specific assessment, including the financing gaps, potential sources of climate finance, and status of plans and strategies, are summarised in Table 6.3 in Chapter 6.

³ Government of Fiji (2019), *Fiji Climate Finance Snapshot (2016–2019)*.

1. Introduction

The Climate Change Section of the Commonwealth Secretariat focuses on strengthening the resilience of Commonwealth countries to the negative impacts of climate change. It facilitates capacity development of member countries to access public and private climate funding to implement the Paris Agreement on Climate Change.

The Commonwealth Climate Finance Access Hub (CCFAH) was established following recommendations arising out of the Commonwealth Expert Group on Climate Change, which examined how the Commonwealth could best assist its developing country members to build resilience. Launched in 2016, CCFAH provides long-term capacity development to support improved access to climate finance.

In the last three years, the CCFAH has evolved to become one of the flagship programmes of the Commonwealth Secretariat and provides a technical assistance programme to climatically vulnerable countries in the Asia, Africa and Caribbean regions, with some concrete results in terms of mobilisation of climate finance. The CCFAH is at present expanding in the Pacific region.

A further priority of the Commonwealth Secretariat in the Pacific is the CommonSensing project, which is based on a partnership between Fiji Islands, Solomon Islands and Vanuatu, and a consortium of international partners, including the Commonwealth Secretariat. The CommonSensing project is providing innovative support to build climate resilience and enhance decision-making, through the use of satellite remote sensing technology and by facilitating access to climate finance. The project is funded by the UK Space Agency, with the UN Institute for Training and Research (UNITAR) as project lead in partnership with the Commonwealth Secretariat, Satellite Applications Catapult, UK Met Office, the University of Portsmouth and Sensonomic.

The Commonwealth Secretariat is committed to improving the capacity of each country to access climate finance beyond the lifespan of the CCFAH and CommonSensing projects and building local capacity for mobilising finance to implement and

accelerate climate action. Moreover, these projects will aim to provide information and evidence to support and enhance funding proposals in key and climatically vulnerable sectors.

1.1 Objectives of the report

An integral component of the CommonSensing Project is to assist countries in accessing climate finance, based on information and data collected from remote sensing sources and by analysing economic impacts. The objective of this report was to improve targeting of climate finance in line with national and sectoral priorities, plans and strategies, and also contribute to the design of the technical assistance provided under the CommonSensing project.

This report documents findings which consider:

- the climate change needs and priorities of Fiji;
- key vulnerable sectors and the status of climate change projects;
- climate finance requirements based on Fiji's nationally agreed targets and ambitions;
- an assessment of data opportunities and utilisation; and
- requirements for institutional, policy and regulatory strengthening.

1.2 Country context

The Republic of Fiji has a total geographical area of 18,272km², which comprises approximately 332 islands, of which 110 are inhabited. The exclusive economic zone (EEZ) covers about 1.3 million square kilometres.⁴

The two largest islands are Viti Levu and Vanua Levu, where the majority of Fiji's population live. As of 2017, the population in Fiji was approximately 884,887, with approximately 90 per cent of the population living in coastal areas. The annual average population growth between 2007 and 2017 was estimated at 0.6 per cent.⁵

4 Government of Fiji (2020), Third National Communication.

5 Ibid.

Urbanisation is increasing in Fiji, which has implications for the provision of urban infrastructure and public services. Over 2007 to 2017, the urban population increased by 16.3 per cent, while the rural population declined by 5.5 per cent – in 2017, 55.9 per cent of Fiji's population resided in urban areas.⁶ The high inflow of rural migrants was a factor in the rapid growth of urban squatter settlements, which have poor quality housing and are considered highly exposed and vulnerable to climate change and disaster risks.

Pacific island countries (PICs) are ranked among the most vulnerable in the world to climate change and natural disasters, and experience a disproportionate impact on local livelihoods, well-being, economic prosperity and security. The 2019 *World Risk Report* ranks Fiji as the world's 12th most at-risk country, due to exposure natural hazards, including large-scale flooding and droughts.⁷ Cyclones have also had a major impact: the most recent Category 5 cyclone, Cyclone Winston, in February 2016, caused 44 fatalities, affected 62 per cent of the population, damaged or destroyed nearly 30,300 houses, and caused damages amounting to F\$2 billion, or 20 per cent of gross domestic product (GDP). The current average asset losses due to tropical cyclones and floods are estimated at more than F\$500 million per year, representing more than 5 per cent of Fiji's GDP.

Furthermore, while Fiji's national CO₂ equivalent emissions make up a mere 0.006 per cent of global emissions, the Fijian government and other stakeholders have already taken steps to achieve decarbonisation in the Fijian economy. Fiji has developed its Nationally Determined Contribution (NDC) Implementation Roadmap, setting a clear pathway to achieve its NDC targets and also launched the Fiji Low Emission Development Strategy (LEDS) 2018–2050 at COP [Conference of the Parties] 24, through which Fiji aims to reach net zero carbon emissions by 2050 across all sectors of its economy.

Despite this commitment, the mobilisation and disbursement of climate finance remains a key challenge, due to limited scalable, tested and bankable projects capable of attracting private sector investment, and a lack of trained technical staff capable of developing and delivering a strategic pipeline of projects with appropriate documentation.

Addressing climate change in Fiji could also be affected by the COVID-19 pandemic. The pandemic has resulted in severe economic impacts to Fiji, including a large reduction in government revenue⁸ (projected to fall 39% in 2020–21) and GDP⁹ (projected to decrease by 19.8% in 2021), and an increasing debt-to-GDP ratio¹⁰ (projected to reach 83% in 2020–21). This could reduce the capacity of the Government of Fiji (GoF) to mobilise climate finance from both domestic and international sources. And given the projected increase in public debt, the GoF may not be willing to access concessional debt to finance climate action (Fiji receives minimal grant financing in comparison to other PICs). This could also be compounded by reductions in aid budgets in developed countries, and downstream impacts to other providers of climate finance, such as dedicated climate funds.

In addition, the provision of technical support on achieving climate action has also been impacted by COVID-19. A number of projects funded by climate finance providers are likely to be delayed, and financing could potentially be redirected away from climate-related activities to short-term needs, such as the humanitarian and health impacts from COVID-19.

6 Government of Fiji (2017), 2017 Census Results, available at: <https://www.fiji.gov.fj/Media-Centre/News/Fiji-Bureau-of-Statistics-Releases-2017-Census-Res>.

7 Bündnis Entwicklung Hilft (2019), *WorldRiskReport 2019*.

8 Howes, S (2020), 'Australia leaves Fiji to flounder', available at: <https://devpolicy.org/australia-leaves-fiji-to-flounder-20200923/>

9 Asian Development Bank (2021), 'Economic indicators for Fiji', available at: <https://www.adb.org/countries/fiji/economy>

10 The Fijian Government (2020), 'Hon. Aiyaz Sayed-Khaiyum's 2020–2021 National Budget Address', available at: <https://www.fiji.gov.fj/Media-Centre/Speeches/HON-AIYAZ-SAYED-KHAIYUM-S-2020-2021-NATIONAL-BUDGE>

2. Review of National Plans and Strategies

In this chapter, a review of the key national plan and strategies and associated climate change priorities, commitments and targets is undertaken. The future mobilisation of climate finance should be aligned to these plans and strategies, particularly the Nationally Determined Contributions (NDCs) and National Adaptation Plan (NAP), while the sectoral/thematic priorities and targets outlined in these frameworks are assessed in further detail in Chapter 5 of this report.

National plans and strategies also outline the governance arrangements, capacity and technical needs, and policy and regulatory reforms required for mobilising climate finance, achieving climate action and engaging the private sector. These recommendations are assessed and collated in Chapter 6 of this report.

2.1 National planning frameworks, commitments and targets

2.1.1 National Development Plan 2017–2036

Fiji has both a 20-Year Development Plan (2017–2036) and a comprehensive 5-Year Development Plan (2017–2021), which provides the vision for all Fijians for sustainable national development. These plans work together, as the 5-Year Development Plan provides a detailed action agenda, with specific targets and policies that are aligned to the long-term transformational 20-Year Development Plan.

The National Development Plan is the outcome of a nationwide consultation process that involved the private sector, civil society, community groups, government and the general public. The National Development Plan is aligned with global commitments, including the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change.

The 20-Year Development Plan outlined a number of targets (described as 'transformational strategic thrusts') to achieve by 2036 around inclusive social, economic and environmental outcomes. Of

particular relevance, is the environmental target to reduce greenhouse gas (GHG) emissions by 30 per cent by 2036. A 10 per cent reduction in GHGs will be achieved through implementation of the Green Growth Framework for Fiji, using available domestic resources, with a further 20 per cent reduction conditional on external funding.

The 5-year plan also outlines a number of targets and key performance indicators across national sectors, including water and sanitation, energy, and food and nutrition security, with targets and indicators relevant to climate activities.

2.1.2 Green Growth Framework for Fiji 2014

The GGF for Fiji was intended to support and complement the 2010–2014 Roadmap for Democracy and the 5- and 20-Year National Development Plans as the successor national development frameworks. The GGF is a tool to accelerate integrated and inclusive sustainable development, which will inspire action at all levels to strengthen environmental resilience, drive social improvement and reduce poverty, enhance economic growth and also build capacity to withstand and manage the anticipated adverse effects of climate change.

The GGF has established targets with the following timelines: short (up to two years), medium (three to five years) and long (beyond five years). The focus of the GGF is on restoring the balance in development that is sustainable for Fiji's future, and committing the country to achieving green growth across sectors. To support the vision for a better Fiji, and taking into consideration the global and regional developments in green growth, the guiding principles of the GGF for Fiji are as follows:

- Reducing carbon 'footprints' at all levels.
- Improving resource productivity (including by doing more with less).
- Developing a new integrated approach, with all stakeholders collectively working together for the common good. The cross-cutting

nature of issues relating to sustainable development requires harmony and synergy in the development strategies.

- Strengthening sociocultural education on responsible environmental stewardship and civic responsibility.
- Increasing the adoption of comprehensive risk management practices.
- Increasing the adoption of environment auditing of past and planned developments, in order to support initiatives that not only provide economic benefits but also improve the environmental situation.
- Enhancing structural reforms for fair competition and efficiency.
- Providing incentives for investment which support the efficient use of natural resources.

Ten thematic areas have been identified and will require an integrated and cross-cutting national focus, supported by an enabling environment, to ensure future development is both sustainable and can be sustained on an ongoing basis (as shown in Table 2.1). Each of the ten thematic areas includes a section on key challenges, as well as on the preferred way forward, including actions and time-bound indicators.

Table 2.1 Green Growth Framework thematic areas

Pillar	Thematic area
Environment Pillar	Building Resilience to Climate Change and Disasters
	Waste Management
	Sustainable Island and Ocean Resources
Social Pillar	Inclusive Social Development
	Food Security
	Freshwater Resources and Sanitation Management
Economic Pillar	Energy Security
	Sustainable Transportation
	Technology and Innovation
	Greening Tourism and Manufacturing Industries

2.1.3 National Climate Change Policy 2018–2030

The National Climate Change Policy (NCCP) 2018–2030 is the central policy instrument for protecting Fiji’s development priorities from current and future climate change risks. The purpose of the NCCP is to provide the high-level guidance, vision and principles, and the institutional architecture and objectives required to establish and support a long-term climate-resilient development pathway. The NCCP creates the mandate for the National Adaptation Plan process, the Low Emission Development Strategy and the development of the National Climate Change Act.

The NCCP includes objectives that will contribute to the implementation of climate change actions and the Sustainable Development Goals (SDGs). Objectives and strategies of the NCCP are categorised into the following seven thematic areas:

- 1 National Risk Governance
- 2 Leadership and Global Climate Action
- 3 Climate Adaptation and Resilient Development
- 4 Climate Mitigation and Resilient Development
- 5 National Capacity Development
- 6 Sustainable Financing
- 7 Private Sector Transition and Engagement

2.1.4 Nationally Determined Contribution 2015–2020

Fiji’s first Nationally Determined Contribution (NDC) has an energy sector focus, with a target of approaching 100 per cent renewable energy share in electricity generation by 2030. The NDC also has a target of decreasing CO₂ emissions by 10 per cent by achieving energy efficiency improvements. The NDC outlines the following goals in the energy sector:

- mobilise investment to develop renewable energy sources and reduce dependence on imported fossil fuels;
- promote and improve guidelines and technical standards for renewable energy technologies in the medium term; and
- undertake research into appropriate renewable energy sources for Fiji, including hydrogen fuel cells.

This contribution would reduce energy sector CO₂ emissions by 30 per cent by 2030, with the renewable target reducing business as usual (BAU) emissions by 20 per cent and the energy efficiency target reducing emissions by 10 per cent. The NDC target is contingent upon external financial support being made available.

The achievement of the emission reduction target specified above will be through both unconditional and conditional means based on available and additional external financing being made available to Fiji. From the 30 per cent emissions reduction target by 2030, 10 per cent will be achieved through the implementation of the Green Growth Framework, utilising resources available in-country (unconditional), whereas the remaining target can only be met with the availability of external funding amounting to US\$500 million (conditional).

Given Fiji's extreme climate vulnerability, the NDC has an adaptation component. The impacts of climate change are considerable in Fiji, and the country faces increased droughts, floods and extreme events such as cyclones. The NDC therefore reiterates the adaptation priorities of Fiji, and includes an action plan for effectively addressing future climate impacts.

2.1.5 NDC Implementation Roadmap 2017–2030

The NDC Implementation Roadmap 2017–2030 (hereafter referred to as the 'NDC Implementation Roadmap') identifies mitigation actions in electricity generation and transmission, demand-side energy efficiency and transportation. The implementation of these actions under the roadmap is divided into short-term (2017–2020), medium-term (2021–2025), and long-term (2026–2030) action periods, and all mitigation actions are closely aligned to existing national policies, strategies and plans.

The NDC Implementation Roadmap aims to support the energy sector to meet the NDC targets by:

- 1 increasing awareness among stakeholders of the requirements of the NDC;
- 2 providing an overarching framework and guidance for the energy sector;
- 3 defining mitigation actions and interventions for emission reductions; and

- 4 providing information on required resources to achieve and track progress in order to meet the NDC targets.

Key mitigation actions of the Implementation Roadmap under the energy sector are divided between the three subsectors of electricity generation and transmission, demand-side energy efficiency, and transportation.

Mitigation actions for *electricity generation and transmission* follow the Fiji Electricity Authority (FEA) development plans to meet the potential of 100 per cent renewable energy electricity generation. The Implementation Roadmap augments FEA's planning with additional renewable energy electricity generation capacity and transmission system needs, including the connection to currently off-grid industry. In addition, the NDC Implementation Roadmap also prioritises standalone solutions (e.g. individual supply or mini-grids for increasing rural household access).

The mitigation actions for *electricity demand-side energy efficiency* can be broadly classified into four types: energy labelling and minimum energy performance standards, energy efficiency in the business community (including tourism), energy efficiency in the public sector, and updated codes and standards for buildings.

Mitigation actions in the *transport* sector include vehicle replacement programmes for buses, taxis, private cars, lorries and minibuses, which are expected to have the largest contribution for CO₂ mitigation. Actions also include increases in use of biodiesel, improved maintenance of sea vessels and increased utilisation of fuel-efficient outboard motors. Additional potential actions to contribute to mitigation and transformational change in the transport subsector include: urban and public transport planning, developing a long-term electric transportation strategy, behavioural change, and alternative propulsion systems in maritime transport.

2.1.6 National Adaptation Plan 2018

The Fiji National Adaptation Plan (NAP) contains 160 adaptation measures over the five-year period from 2018. The NAP aims to provide a climate-resilient development pathway, which enables Fiji to anticipate, reduce and manage environmental and climate risks caused by climate variability and change.

The development of the NAP was highly consultative and involved national-level multistakeholder consultation workshops, as well as key informant interviews with experts, regional Pacific organisations and national civil society. The NAP also consists of a comprehensive

and critical assessment of climate change implications for key sectors and adaptation barriers presented by national and subnational development planning processes. Table 2.2 provides a high-level summary of the key NAP actions.

Table 2.2 National Adaptation Plan overview

Component	Number of actions
Climate information services and management	10 actions – The implementation of the actions for climate information services and management will improve capacity to generate, manage, disseminate and use climate change information. This will support stakeholders to anticipate environmental and climate events before they occur.
Horizontal integration	11 actions – The implementation of the actions for horizontal integration will mainstream climate change issues into national-level development planning processes. This will strengthen co-ordination, increase robustness of planning processes and help to prevent maladaptive outcomes.
Vertical integration	10 actions – The implementation of the actions for vertical integration will integrate climate change issues into subnational development planning processes. This will reduce vulnerability, by tackling environmental and climate risks where they are experienced and enabling local-level experiences to inform national processes.
Climate change awareness and knowledge	11 actions – The implementation of the actions for climate change awareness and knowledge will enhance understanding of climate change, by increasing the flow of relevant information to relevant adaptation stakeholders. This will empower stakeholders to engage in decision-making and understand potential contextualised adaptation measures.
Resource mobilisation	13 actions – The implementation of the actions for resource mobilisation will improve the amount of resources available and the way available resources are utilised. This will enhance the accumulation and co-ordination of resources, to support the transition to a climate-resilient economy.
Food and nutrition security	23 actions – The implementation of the actions for food and nutrition security will improve capacity to anticipate and reduce environmental and climate risks, and support sustainable food production efforts. This will transform and re-orientate the agricultural system to support food production, without degrading resources.
Health	10 actions – The implementation of the actions for health will improve systems and infrastructure to manage the negative impacts caused by future climate variability and change. This will support efforts to provide resilient health and medical services that can withstand future environmental and climate events.
Human settlements	12 actions – The implementation of the actions for human settlements will reduce vulnerability to major assets, infrastructure and population centres, providing the ingredients for resilient growth. This will support efforts to provide resilient population centres, which can provide a firm basis for sustainable investments and continued economic prosperity.
Infrastructure	44 actions – The implementation of the actions for infrastructure will help to ensure the full lifespan of investments can be reached, by addressing environmental and climate risks. This will support efforts to provide resilient infrastructure, which can operate under future conditions and meet future needs.
Biodiversity and the natural environment	16 actions – The implementation of the actions for biodiversity and the natural environment will support the maintenance of vital ecosystems and the services they provide. This will support efforts to protect, maintain and restore the natural capital that underpins society and economic growth.

2.1.7 Climate Change Vulnerability Assessment (CCVA) 2018

The Fijian government led the preparation of Fiji's first-ever CCVA, with support from the World Bank. The Climate Change and International Cooperation Division (CCICD), Ministry of Economy, directed a multisector task force that brought together expertise from across government agencies to integrate adaptation and risk management in carrying out this assessment. Through this approach, the task force has put forward a number of strategies to enhance Fiji's resilience to geophysical and climate-related hazards. This has been reflected in the priority actions of the CCVA. The CCVA identified five major intervention areas to adapt to climate change. These five intervention areas are summarised in Table 2.3.

2.1.8 Low Emission Development Strategy 2018–2050

The central goal of the Low Emission Development Strategy (LEDS) is for Fiji to reach net zero carbon emissions by 2050 across all sectors of its economy. The LEDS has put forward four possible low emissions scenarios for Fiji: (i) a business-as-usual (BAU) unconditional scenario; (ii) a BAU conditional scenario; (iii) a high-ambition scenario; and (iv) a very high-ambition scenario.

The LEDS presents scenarios for all key sectors: electricity and other energy use; land transport; domestic maritime transport; domestic air transport; agriculture, forestry and other land use; waste; and coastal wetlands ('blue carbon'). The LEDS shows that under the very high ambition

Table 2.3 Summary of CVA key intervention areas

Intervention area	Overview
Ensure serviced land and housing is built in safe areas	Land-use planning is critical in ensuring that safer urban development is carried out and safe areas can be identified for future development. The current residential land shortage should be addressed in a resilient and sustainable manner. Informal settlements should be upgraded, taking into account current and future risks, where security of tenure can be successfully negotiated with the landowner.
Strengthen infrastructure to meet the needs of the Fiji economy and population	This requires large investments in flood risk management and coastal protection measures. The transport sector will require the greatest investment to build the country's resilience. Strengthening the energy sector will require a range of critical investments. Water sector investments are needed to protect assets against natural hazards. Finally, investments in health and education infrastructure are needed to strengthen existing assets, as well as construct new, robust facilities.
Support for agriculture and fisheries development should be sufficient for the climate, environment and economy, now and for the future	The government and other stakeholders have suggested that sustained, effective investment in improved coastal fisheries management will not only improve fisheries productivity, but also increase communities' resilience to climatic and other shocks – should these eventuate.
Conservation policies can protect assets and reduce adaptation costs	This may include protection of mangrove areas, coastal systems, watersheds, forests, soil and soil fertility, investment in community-led activities, an increased budget for management of protected areas, and increased effort in waste management.
The government needs to build socioeconomic resilience, by taking care of the poor, and ensuring inclusive economic growth	Improving early warning effectiveness and preparedness will save lives and protect assets. Social protection can be further strengthened to make the population better able to cope with shocks, and insurance-based solutions can be explored. Improving the healthcare system is a development priority. Targeted gender interventions and specific measures to protect vulnerable populations can complement actions in different sectors and should be prioritised.

scenario, net zero emissions could be achieved during the year 2041, after which emissions would increasingly be net negative. The most significant mitigation of emissions would result from complete transformation of Fiji's energy sector to one based on a wide variety of on-grid and off-grid renewable energy generation. The LEDS outlines a number of actions for all key sectors, as outlined in Table 2.4.

2.1.9 Third National Communication 2019

The Third National Communication provides information on Fiji's Greenhouse Gas Inventory for the 2006 to 2011 reporting period. The document also reports on the country's vulnerability to

climate change and measures to address and adapt to these vulnerabilities, alongside options for climate change mitigation. The Third National Communication also assess a number of constraints and gaps relating to financial, technical and capacity needs in Fiji.

Between 2006 and 2011, Fiji emitted on average 2,500Gg [gigagrams] of CO₂e (carbon dioxide equivalent) per year. The energy sector contributed the majority of emissions across each year, with 59 per cent of all emissions, followed by agriculture with 22 per cent and forestry with 15 per cent and waste the remaining 4 per cent. Energy emissions include fossil fuel combustion and land transport emissions.

Table 2.4 Sectoral key actions under the Low Emission Development Strategy

Sector	Key actions
Electricity and other energy	<ul style="list-style-type: none"> • Economy-wide energy efficiency measures, such as: <ul style="list-style-type: none"> – implementation of minimal energy performance standards and labelling; – review, assessment and revision of national codes and standards for buildings and industry; and – adoption of relevant ISO standards for energy management for businesses, the community and public buildings. • Capacity building for renewable energy and smart grids. • A centralised renewable energy resource database. • New solar, hydro, biomass, wind, waste-to-energy, biogas, geothermal and energy storage installations.
Land transport	<ul style="list-style-type: none"> • A national electric mobility strategy. • Transition to hybrid-electric and electric vehicles. • Promotion of public transport and non-motorised transport systems.
Maritime transport	<ul style="list-style-type: none"> • A national action plan for decarbonisation of maritime transport. • Transition from 2- to 4-stroke engines. • Revitalisation of traditional sailing culture and development of low-carbon vessels. • For domestic aviation: <ul style="list-style-type: none"> – replacement of the domestic fleet with more efficient aircraft; – transition to solar power for all off-grid airports with solar gate power; and – transition to biojet fuel.
Agriculture, forestry and other land use	<ul style="list-style-type: none"> • Reduced deforestation and increases in plantation productivity. • Extensive afforestation. • Reduced enteric fermentation, manure management and measures to train farmers in the use of synthetic fertilisers.
Waste	<ul style="list-style-type: none"> • A national reduce-reuse-recycle ('3R') policy. • Waste-to-energy systems at wastewater and landfill facilities. • Waste management awareness programmes.

3. Climate Finance Overview

3.1 Overview

The Fiji Climate Finance Snapshot 2016–2019 compares the average annual climate finance flows in Fiji to the average annual identified climate finance needs, as laid out in Fiji's development and climate documents. The reports aims to identify emerging trends and gaps in the recent climate finance landscape and identifiable cost estimates. Given this report accounts for domestic and international sources of climate finance, the data from this report was used instead of the data sources used in the CommonSensing reports for Solomon Islands and Vanuatu. The other CommonSensing reports instead used data from the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) and development partner websites.

Overall, an estimated F\$1.94 billion in domestic and international public climate finance was allocated to Fiji annually between 2016 and 2019 (see Table 3.1). In the end, roughly F\$781 million of this allocated funding was spent annually.

3.2 Methodology for determining climate finance flows

Climate finance is enshrined in the UN Framework Convention on Climate Change (UNFCCC). Article 4 of the UNFCCC Convention states that developed countries, particularly OECD member countries, should assist developing countries with financial resources to meet their climate change obligations. Further, Article 9(1) of the Paris Agreement, also states that 'developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention'. These funds are managed by several multilateral and bilateral institutions.

Instead of using the DAC OECD Rio markers, which were used to determine which projects should be included within the climate finance flows as a climate-focused project in the Solomon Islands and Vanuatu CommonSensing reports, the Snapshot Report uses domestic and international climate finance data – as collected and provided by the Fijian government and its external partners.

Table 3.1 Climate finance flows in Fiji over 20162019

Sector	Average annual allocated funding (F\$ per year)	Average annual expenditure (F\$ per year)	Total estimated annual needs based on development and climate documents
Disaster Risk Management	779,784,007	197,340,721	275,870,000
Transport	636,150,348	383,434,761	2,259,277,427
Water and Sanitation	173,185,475	86,370,851	162,650,000
Electricity	88,417,134	55,204,518	561,663,741
Agriculture	74,060,965	32,681,315	1,247,429
Blue Economy	72,374,383	7,784,803	5,470,000
Policy and Governance	56,899,171	9,219,412	500,000
Housing	30,164,062	5,590,975	11,390,000
Health	11,308,348	0	130,000
Forests	10,138,681	4,221,067	7,789,663
Migration / Relocation	5,261,998	0	0
Total	1,937,744,572	781,848,423	3,285,988,260

In the Snapshot Report, projects were categorised based on the following sectors and thematic areas:

- Disaster Risk Management
- Transport
- Water and Sanitation
- Electricity
- Agriculture
- Blue Economy
- Policy and Governance
- Housing
- Health
- Forests
- Migration / Relocation

The data from the Snapshot Report were based on 535 projects across 12 sectors. These projects are funded by the Fijian government and various United Nations agencies, multilateral development banks (MDB), bilateral development partners, foundations and civil society organisations.

This report is primarily based on an annual assessment, conducted by the Climate Change Division in the Ministry of Economy, of the projects in Fiji’s annual budget that are helping to address the country’s climate needs. It also includes self-reported information from external partners regarding their climate-related support between 2016 and 2019.

3.3 Methodology for undertaking gap analysis

The national targets, goals and commitments summarised in Chapter 2 and the sectoral priorities summarised in Chapter 5 provide the baseline for determining the climate financing gaps. In Chapter 5, the progress in achieving national and sectoral targets, goals and commitments is assessed based on the criteria outlined in Table 3.2.

This assessment is based on a qualitative screening of the climate finance received in a sector (which is further elaborated in Chapter 5), in relation to the climate change-related national and sectoral plans, targets and goals (particularly the priority measures outlined in the NAP, LEDS and the NDC Implementation Roadmap).

Table 3.2 Criteria for assessing climate finance inflows into sectors

Status	Criteria
Satisfactory progress	<ul style="list-style-type: none"> • Climate finance inflows are sufficient and are aligned to national and sectoral plans, targets and goals. • Data is available.
Limited progress	<ul style="list-style-type: none"> • Limited climate finance inflows and/or climate finance projects are not aligned to national and sectoral plans, targets and goals. • Data is available.
Limited data on progress	<ul style="list-style-type: none"> • Limited baseline of projects (e.g. no project pipeline in national/sectoral plans). • Limited data on climate finance inflows.

4. Data Access and Utilisation

Space applications and geospatial technology are evolving, and the usage of these geospatial services is expected to dramatically increase in the coming years. Advancement in geospatial services is allowing Pacific island countries to leverage existing geospatial technology and explore emerging applications in geospatial data.

This opens opportunities for Fiji to maximise the technology for undertaking climate change actions and designing and implementing projects and programmes. Space applications can contribute to achieving the goals set out in the United Nations Framework Convention on Climate Change, the Paris Agreement and the 2030 Agenda for Sustainable Development.

The applicability and utilisation of satellite remote sensing (SRS)¹¹ and Earth Observation (EO)¹² data for climate change projects in each sector/thematic area are outlined below in Chapter 5.

Despite advances in the availability and quality of space applications and geospatial information, several gaps and challenges in their effective use remain. For example:

- At present, the utilisation of EO data for project design and implementation has been undertaken in an ad hoc manner, with higher utilisation in the energy, forests and land use, disaster risk reduction (DRR), agriculture

and water sectors. The need to develop the capacity to collect, manage and generate climate knowledge is relevant to all of the adaptation and mitigation priorities outlined in Chapter 5.

- Several regional activities have been undertaken in Fiji since 1992 to support SRS application, including the South Pacific Community (SPC). However, at the government level, there has been limited awareness, capacity and capabilities for using EO data, which restricts the potential for upscaling of EO data applications in Fiji. Several ongoing or pilot projects have been demonstrated in Fiji, which are summarised in Chapter 5.
- There is a lack of co-ordination and information sharing between institutions, which acts as a barrier for EO data utilisation. Many institutional and financial barriers to data access also exist, including a lack of centralised data storage, the high cost of data collection and processing, and difficulties centralising, securing and sharing different types of data across institutions.¹³

The barriers to accessing and utilising data, and solutions to overcome these challenges, are further described in section 6.3.

11 A remote sensing satellite carries one or more instruments for recording images of the Earth, which are transmitted to a receiving station using radio waves. Remote sensing is the action of collecting images or other forms of data about the surface of the Earth, and subsequent processing/analysis.

12 Earth observations are observations from above using technologies, such as aircraft, satellites and various sensors, to create images that are used to study what is happening on or near the surface of the earth.

13 UN Economic and Social Commission for Asia and the Pacific (UNESCAP) (2019), 'Satellite communications in the Pacific Island Countries', Asia-Pacific information superhighway working paper.

5. Sector Assessments

Fiji is highly vulnerable to climate change, due to its geographical location, the location of much of its population and assets in coastal areas, and the importance of natural resources to its main economic sectors. Natural hazards and climate hazards pose major challenges to the achievement of its National Development Plan. Fiji is especially vulnerable to floods and tropical cyclones, which already have significant impacts on the economy and society.¹⁴ The exposure of Fiji to natural hazards will become more intense because of climate change.

In the Third National Communication, Fiji's per capita emissions were estimated at 2.8 tons or around 40 per cent of the world average, which in absolute terms, is around 0.006 per cent of world emissions.¹⁵ Fiji's main GHG emissions consist mostly of carbon dioxide (CO₂) from the energy sector, with smaller amounts of methane (CH₄) and nitrous oxide (N₂O) from agriculture and waste. Forestry emissions were understood to be slightly positive, at around 380Gg per annum, but this was reported as uncertain.

The status of climate finance utilisation in each sector/thematic area is assessed in this section. The climate finance projects are qualitatively assessed in relation to the climate change-related national and sectoral plans, targets and goals.

5.1 Transport

5.1.1 Profile

The transport sector (land, maritime and domestic aviation) is vital for economic connectivity, supporting livelihoods and facilitating delivery of public services. The transport sector contributes about 12 per cent towards Fiji's gross domestic product (GDP) and has an estimated 30 per cent capital budget allocation annually.¹⁶ As a maritime nation, shipping plays a particularly important role in Fiji, with people relying on sea transport not just for trade and fishing, but also for personal transport and access to crucial services, such as health and education.¹⁷

The transport sector is highly vulnerable to natural hazards, accounting for 46 per cent of annual asset losses from disasters, and it will require an estimated investment of F\$4.3 billion (approximately US\$2.0 billion) to increase sector resilience.¹⁸ Poor road conditions affect the functioning of key sectors, especially agriculture and tourism. The exposure of transport systems to climate hazards is expected to increase, as the frequency and severity of environmental and climate hazards increases. The impact of climate change on transport infrastructure will also likely be exacerbated by poor maintenance, which is currently an issue in Fiji.¹⁹ Given these impacts, development of climate resilient transportation infrastructure is a priority.

The transport sector (land, marine and domestic aviation) is the primary consumer of fossil fuels in Fiji. It is the major GHG emissions contributing sector – 64 per cent of energy sector emissions and 39 per cent of overall emissions, mostly from road vehicles (71% passenger cars and 18% trucks). Traffic congestion is an issue in urban areas of Fiji, and vehicle ownership has increased over the 2012–2018 period. Without strong mitigation actions, such as increasing the share of electric vehicles and public transport, it is likely that transport sector emissions will continue to increase.²⁰

The Fijian government has embarked on projects to improve transport infrastructure in the country. Substantial amounts of funds have been allocated to the Fiji Roads Authority to undertake major projects in the country, including construction and rehabilitation of roads and bridges. The Land Transport Authority is also implementing several actions to reduce emissions from the transportation sector, including public education about air pollution from vehicles, increased inspections, data collection and emissions testing, strengthened fuel standards for diesel and gasoline, and fines for violations of emissions standards.²¹

18 Government of Fiji (2020), Third National Communication.

19 Ibid.

20 Fiji Bureau of Statistics (no date), 'Distribution of Vehicles Registered in Fiji', available at: <https://www.statsfiji.gov.fj/statistics/other-statistics/registered-vehicles>

21 United Nations General Assembly (UNGA) (2019), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*, available at: <https://undocs.org/A/HRC/43/53/Add.1>

14 Government of Fiji (2018), National Adaptation Plan.

15 Government of Fiji (2020), Third National Communication.

16 Ibid.

17 Government of Fiji (2018), Low Emissions Development Strategy.

However, further support is needed, as outlined in the NAP, Climate Change Vulnerability Assessment (CCVA), LE DS, NDC Implementation Roadmap and sectoral plans.

The development of low-carbon climate resilient transport systems in Fiji will result in a number of co-benefits. These include:

- Health co-benefits from reduced GHG emissions in the transport sector, which include increases in physical activity and reductions in mortality from pollution.²²
- Increased asset life and reduced repair and maintenance costs, as preparing for climate change at the outset can avoid the need for costly retrofitting and reduce the risk of the asset becoming damaged due to climate hazards and/or prematurely obsolete.²³
- Improved connectivity and reduced risk of climate hazards causing disruption to transport networks. This will result in economic and social benefits from improved mobility and increased access to markets, jobs and public services (such as education and healthcare).

The Maritime and Land Transport Policy articulates the Government of Fiji's ambition to develop efficient and accessible decarbonised transport systems. The policy aims to reduce the environmental impacts from all forms of transportation and reduce climate change impacts on transportation infrastructure, including through the use of fuel-efficient vehicles and development of public transport systems. For maritime transport, the policy promotes improved efficiency at ports, the introduction of fuel-efficient technology to minimise CO₂ emissions, and the development and introduction of low-carbon propulsion alternatives and hull designs.

The Greater Suva Transportation Strategy 2015–2030 articulates the ambition of the Government of Fiji (GoF) to increase the affordability and quality of public transportation, while also increasing sustainability by reducing dependence on fossil fuels. This strategy has been further elaborated in

the LE DS, which aims to reduce emissions for land transport to close to zero by 2050. The strategy identifies six key issue areas with associated aims and objectives the strategy aims to address.

5.1.2 Access to climate finance

The majority of climate change-related projects in the transport sector in Fiji have focused on building resilience. According to the Snapshot Report, the current annual climate finance expenditures in the transport sector exceed F\$383 million. More than F\$320 million, or 83 per cent of all expenditures, was spent annually to upgrade, expand and improve the standards of infrastructure such as roads, bridges and jetties, so that the infrastructure can withstand growing climate impacts. An example highlighted in the Snapshot Report is the development low-lying river crossings in rural areas by the Fiji Roads Authority. These crossings function as bridges when the weather is clear and rivers are stable, but can then be submerged, without breaking, when heavy rains cause the rivers to flood. These crossings are cheaper than conventional bridges and allow Fiji Roads Authority to reduce its flood-related reconstruction costs.

Fiji has successfully accessed finance for the following projects, which have a strong climate change component:

- The Fiji Transport Infrastructure Investment Sector project (financed by the Asian Development Bank [ADB] and World Bank) has a focus on building transport sector resilience through land and maritime transport infrastructure rehabilitation and construction and institutional strengthening of the Fiji Roads Authority.²⁴
- Fiji Roads Authority is also procuring consultancy services through the Asian Development Bank/World Bank in order to update its existing design standards and construction specifications for roads and bridges. This support incorporates climate change adaptation considerations in the road sector, and works to ensure more climate resilient road sector assets in line with Fiji's NAP and Green Growth Framework.

22 Shaw, C, S Hales, P Howden-Chapman and R Edwards (2014), 'Health co-benefits of climate change mitigation policies in the transport sector', *Nature Climate Change*, Vol 4, 427–433, available at: [10.1038/nclimate2247](https://doi.org/10.1038/nclimate2247).

23 OECD (2018), *Climate-resilient Infrastructure*, OECD Environment Directorate.

24 World Bank (2015), Fiji Transport Infrastructure Investment Project, available at: <https://projects.worldbank.org/en/projects-operations/project-detail/P150028>

Table 5.1 Status of climate finance projects in the transport sector²⁵

Financing priority	Low-emissions transport projects, climate resilient transport projects, strengthening the enabling environment.
Financing status	Limited progress: Further financing needed, particularly for mitigation actions.

- Moreover, the Fiji Roads Authority, which is responsible for managing all roads, bridges and jetties in Fiji, has received substantial amounts of funds to construct and upgrade transport infrastructure, although this has not been labelled as 'climate finance' by development partners.
- Development partners have provided technical support on low-carbon planning for the transport sector, including by developing the NDC Implementation Roadmap and the LEDS. However, in general, limited climate finance has been provided to implement low-carbon transport options.

Actions to reduce emissions in the transport sector have fallen short of identified needs. Additional funding is needed to achieve mitigation actions in the marine and land transport sectors – including procuring decarbonised vessels and upgrading the vehicle fleet to electric vehicles. Table 5.1 shows the current status of climate finance projects in the transport sector.

Developing a climate-resilient low-carbon transport sector is a priority for GoF. Key climate change plans in Fiji articulate transport sector specific targets and projects, including the NDC Implementation Roadmap 2017–2030, Low Emissions Development Strategy 2018–2050 and the National Adaptation Plan 2018. Potential projects to increase climate resilience in the transport sector and reduce transport emissions are shown in Table 5.2 and Table 5.3.

In addition, Table 5.4 details the key sources of financing for the transport sector in Fiji.

5.1.3 Potential data utilisation and application

In the Pacific, the Pacific Islands Chapter of the Internet Society (PICISOC) facilitates the

advancement of geographic information system (GIS) and remote sensing (RS) technologies and to promote SRS within the national groups. For climate change adaptation projects in the transport sector, satellite remote sensing (SRS) data could be used as follows:

- Earth Observation (EO) data (i.e. Kacific, Sentinel-2, Himawari 8, etc.) can be used to monitor the impacts of climate change stressors or hazards (heavy rainfall and sea-level rise, and associated coastal and inland flooding and landslides and soil erosion) on road networks and bridges over time. This information can be used to inform policy-makers for transport infrastructure what is most at risk and in need of maintenance – for example, EO data can be used to ascertain the condition of roads and bridges, including the presence of transport infrastructure damage and deformation. With the demand for tourism, Fiji domestic flights are well established using global positioning system (GPS) navigation to cover more than 300 islands.
- The construction and upgrading of roads, including the viability of constructing roads in inaccessible areas, can be designed, evaluated and monitored cost effectively by EO data. Satellite data can be used to monitor the economic impact of past, current and future transport projects, which could include the benefits to rural communities and farmers from improved connectivity.
- EO data could also be used for investment decision-making and monitoring for climate change mitigation projects in transport and other mitigation sectors (e.g. NASA's new Orbiting Carbon Observatory-2 space satellite could be used to investigate the carbon cycle).²⁶
- A recent study by the Global Green Growth Institute (GGGI 2019) on the adoption of electric vehicles in Viti Levu recommended various technical, regulatory and planning requirements for adopting electric vehicles in Fiji's transport sector. Here, EO data could be used to inform infrastructure development.²⁷

26 NASA, Orbiting Carbon Observatory 2, available at: https://www.nasa.gov/mission_pages/oco2/index.html

27 Global Green Growth Institute (2019), Project Reference Profiles – Fiji(FJ04) Green growth governance – Evidence-based policies for the sustainable use of energy resources in the Asia-Pacific Region, available at: <https://gggi.org/project/project-reference-profiles-fijifj04-green-growth-governance-evidence-based-policies-for-the-sustainable-use-of-energy-resources-in-the-asia-pacific-region/>

25 Author's own analysis.

Table 5.2 Mitigation actions in the transport sector²⁸

Action	LEDS 2018	NDC Implementation Roadmap 2018
Promotion of equitable and sustainable public transport (including developing a public transport plan with clear and measurable mid- to long-term targets and milestones).	✓	✓
Upgrade vehicle fleet (inc. electric vehicles) and improve regulation.	✓	✓
A national electric mobility strategy.	✓	✗
Transition to hybrid-electric and electric vehicles.	✓	✓
Develop fuel standards and encourage alternative fuels.	✓	✓
Reduce congestion and improve transport efficiency.	✗	✓
Increase walking and cycling.	✓	✓
Increase maritime fuel efficiency.	✓	✓
A national action plan for decarbonisation of maritime transport.	✓	✓
Revitalisation of traditional sailing culture and development of low carbon vessels.	✓	✓
Replacement of the domestic fleet with more efficient aircraft.	✓	✗
Transition to solar power for all off-grid airports with solar gate power.	✓	✗
Transition to biojet fuel.	✓	✗
Design and execute an awareness campaign among key stakeholders and the public, and addressees of the incentive scheme/action	✓	✓
Provide capacity building and training to key stakeholders.	✓	✓
Institutionalise a command and control mechanism to strengthen data and information gathering, reporting and verification, and to increase compliance.	✗	✓

While SRS data provide numerous opportunities to strengthen decision-making and realise cost efficiencies, conventional methods of data collection are still necessary. It is also important that data collected through surveys are used to inform climate change projects, and this includes the present trip distances per mode of transport and the projected mode shift for users. This data would be required to calculate the potential future demand for particular modes of transport, and therefore the expected economic benefits.

5.2 Energy

5.2.1 Profile

The energy sector is a critical driver of human and economic development in Fiji, including by providing public services, facilitating business activity and reducing poverty. The energy sector

in Fiji is characterised by very high dependency on petroleum fuel imports for electricity generation and transport, leading to high energy costs.

The energy sector is the predominant emitter of GHGs in Fiji, mostly from fossil fuel use in the transport sector and also diesel and heavy fuel oil use for electricity generation. The country remains highly dependent on imported petroleum fuel, with the country among the ten most vulnerable countries in the Asia and Pacific region to oil price volatility.²⁹

Fiji has invested heavily in renewable energy in recent decades. The energy mix for electricity generation comprises mainly hydropower (varying between 45 and 65 per cent over the last ten years,

28 Ibid.

29 United Nations Economic and Social Commission for Asia and the Pacific (2012), 'Pacific Perspectives on the Challenges to Energy Security and the Sustainable Use of Energy', available at: <https://www.unescap.org/sites/default/files/energy-security-final.pdf>

Table 5.3 Adaptation actions in the transport sector³⁰

Action	NAP 2018
Undertake a condition inspection of Fiji Roads Authority assets, with a view to establish a comprehensive plan to address any issues uncovered relating to serviceability and climate and disaster resilience.	✓
Review the renewal and upgrading of water crossings on road infrastructure to ensure they can withstand current and future environmental and climate risks.	✓
Renew, upgrade, and strengthen road infrastructure, including bridges, ensuring that current and future environmental and climate risks are incorporated into their design.	✓
Develop and upgrade climate-resilient jetties and landings on outer islands where needed, as well as supporting road infrastructure.	✓
Repair and upgrade navigation aids, in particular lighthouses and beacons, so that they are climate and disaster resilient, as well as in compliance with relevant international standards.	✓
Review and upgrade airport and airstrip infrastructure, so that it is climate- and disaster-resilient, as well as meet international standards.	✓
Develop certification standards for climate proofing transport infrastructure and establishing enforcement measures to ensure compliance.	✓
Strengthen and upgrade existing ports, so that they are climate- and disaster-resilient, as well as meet international standards.	✓
Promote institutional strengthening and capacity building for an integrated transport strategic planning framework, which identifies co-benefits with the Low Emission Development Strategy.	✓

Table 5.4 Key sources of financing for the transport sector

Financing instruments	Grant and loan financing.
Financing sources	Global Climate Fund (GCF), MDBs (e.g. ADB and World Bank [WB]), bilateral donors (e.g. Japan International Cooperation Agency [JICA]).

depending on annual rainfall and other factors) and thermal (industrial diesel oil and heavy fuel oil), with some contributions from biomass and wind power (1–3%) and less than 1 per cent contributed by solar during 2005–2015.³¹

About 90 per cent of Fiji's population, and nearly all urban households, have access to electricity (98% urban and 80% rural), mostly through the state-owned Fiji Electricity Authority.³² Grid-connected customers paying the full cost of supply overall, although there is a cross-subsidy from urban to rural consumers. Rural electrification is increasingly based on renewable energy, with thousands of solar home systems now deployed.³³ The Fiji Rural Electrification Fund, which was

launched during Fiji's COP23 Presidency, aims to provide renewable energy to Fiji's outlying islands and villages. Vio village launched the first pilot site in 2019 and the fund is looking to expand to another ten sites.

As with other infrastructure, on-grid and off-grid electricity generation is also at risk due to climate change and natural hazards. This includes sea-level rise, floods and cyclones and other extreme weather events (particularly hydropower facilities and electricity transmission lines). Certain feedstocks used in biofuel and biojet production could also be adversely affected by severe weather, such as cyclones, and, thus, measures will need to be taken to consider these risks.³⁴ It is also worth

30 Ibid.

31 Government of Fiji (2014), A Green Growth Framework of Fiji.

32 Government of Fiji (2020), Third National Communication.

33 Government of Fiji (2017), Draft National Development Plan.

34 Government of Fiji (2018), Low Emissions Development Strategy.

noting that extreme weather events, including natural disasters, could create pressures to 'fall back' on more conventional off-grid fossil fuel-based energy systems – for example, diesel generators, when existing generation systems are off-line – hence, there is a need to make preparations that avoid those options where possible.³⁵ It is estimated that F\$446 million of investment needs are required for increasing adaptive capacity and climate resilience in the energy sector.³⁶

The development of low-carbon energy systems in Fiji will result in a number of co-benefits in addition to GHG emissions reductions. These include:

- Overall energy security, which is expected to increase, as the resilience of the energy supply will be strengthened and the exposure to fossil fuel price fluctuations will decrease, which will also result in improved macroeconomic outcomes.³⁷
- Increased usage of renewable energy, which will result in employment opportunities. The LEDS states that in the long term, green employment in the energy sector will be considerably higher due to construction and maintenance of renewable energy systems.³⁸

The main policy documents for the Fiji energy sector include: The National Energy Policy 2013 (draft), Fiji's First NDC 2015, the NDC Implementation Roadmap, the Fiji Green Growth Framework, and the NDP. In the NDP, the energy sector goals include 100 per cent access to electricity by 2021 and 100 per cent electricity generation from renewable energy sources by 2036.

The mitigation part of the NDC has an energy sector focus, and a different target to the NDP, with a 2030 target of 100 per cent renewable energy

share in electricity generation by 2030. In addition, the NDC has a target of decreasing CO₂ emissions by 10 per cent by achieving energy efficiency improvements. The renewable energy sector targets in new NDC should be reviewed.

Moreover, the draft National Energy Policy sets out the GoF direction for a resource-efficient, cost-effective and environmentally sustainable energy sector. The objectives of this energy policy are:

- to provide all Fijians with access to affordable and reliable modern energy services;
- to establish environmentally sound and sustainable systems for energy production, procurement, transportation, distribution and end-use; and
- to increase the efficient use of energy and the use of indigenous energy sources to reduce the financial burden of energy imports on Fiji.

The policy and associated action plan provides a framework for strengthening energy security, by increasing energy supply and reducing fossil fuel dependency. The policy focuses on six key strategic areas that include utilising renewable energy resources, strengthening the enabling framework for private sector investment, undertaking a comprehensive assessment of Fiji's renewable energy resources and improving energy efficiency.

5.2.2 Access to climate finance

The GoF has been able to mobilise resources from several development partners in support of energy sector targets, with significant commitments made towards renewable energy development and increasing rural energy access. According to the Snapshot Report, nearly 80 per cent of the finance from budget allocations in the electricity sector (almost F\$71 million) and nearly 95 per cent of the annual actual spending (or F\$52.4 million) went to support projects to expand the grid and improve electrification. This amounts to just under half of the total finance needed to deliver reliable electricity services to all Fijians.

Climate finance has been successfully mobilised for a number of projects in the energy sector. Key projects include:

- Fiji Renewable Energy Power Project (FREPP), which involves the removal of major barriers to the widespread and cost-effective use of grid-based renewable energy supply

35 Government of Fiji (2018), National Adaptation Plan.

36 Government of Fiji (2020), Third National Communication.

37 Bruckner T, IA Bashmakov, Y Mulugetta, H Chum, A de la Vega Navarro, J Edmonds, A Faaij, B Fungtammasan, A Garg, E Hertwich, D Honnery, D Infield, M Kainuma, S Khennas, S Kim, HB Nimir, K Riahi, N Strachan, R Wiser and X Zhang, '2014: Energy Systems', in O Edenhofer, R Pichs-Madruga, Y Sokona, E Farahani, S Kadner, K Seyboth, A Adler, I Baum, S Brunner, P Eickemeier, B Kriemann, J Savolainen, S Schlömer, C von Stechow, T Zwickel and JC Minx (eds.), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

38 Government of Fiji (2018), Low Emissions Development Strategy.

via commercially viable renewable energy technologies (financed by GEF and the UN Development Programme [UNDP]).³⁹

- Support from regional programmes, including the Pacific Renewable Energy Program (funded by the ADB). This is an umbrella facility to provide financing support, including loans, guarantees and letters of credit, to overcome the constraints to private sector investment in renewable power projects in Pacific island countries.⁴⁰
- The Global Climate Fund (GCF)-funded Fiji Agrophotovoltaic Project in Ovalau, which aims to overcome barriers of financing, technical capacity and limited availability of land by supporting an innovative technology that combines photovoltaic power generation, a battery energy storage system and agricultural production.⁴¹
- Support from bilateral partners on energy access and renewable energy supply, including from Australia, New Zealand, Japan and Korea.
- Technical support from multilateral development partners, including the Global Green Growth Institute.
- Technical support from the ADB-funded Support for Energy Sector Regulatory Capacity and Electrification Investment Planning project, which focused on capacity building, institutional strengthening and the development of an electrification master plan.⁴²

Current climate finance flows to increase renewable energy generation are falling short of the identified needs. It is estimated in the Snapshot Report that F\$338 million, on average per year, should be invested by public and private actors into new hydro, wind, solar and geothermal generation projects, so Fiji can decarbonise its electricity sector by 2050.

39 Global Environment Fund (2010), PAS: Fiji Renewable Energy Power Project (FREPP), available at: <https://www.thegef.org/project/pas-fiji-renewable-energy-power-project-frepp>.

40 ADB (2019), Regional: Pacific Renewable Energy Program, available at: <https://www.adb.org/projects/52329-001/main#project-overview>.

41 Green Climate Fund (2020), SAP016: Fiji Agrophotovoltaic Project in Ovalau, available at: <https://www.greenclimate.fund/project/sap016>

42 ADB (2014), Fiji: Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, available at: <https://www.adb.org/projects/48049-001/main#project-pds>.

Table 5.5 Status of climate finance projects in the energy sector⁴³

Financing priorities	Increasing rural access and renewable energy (RE) generation, implementing energy efficiency measures, strengthening regulation and the enabling environment, undertaking capacity building.
Financing status	Limited progress: Additional assistance is needed, and improved data is required for tracking progress against goals and targets.

According to the Snapshot Report, actual expenditures in the electricity sector were about 62 per cent of the allocated levels – and allocation of climate finance to energy efficiency actions was substantially less than identified needs.

Table 5.5 provides an overview of the status of climate finance projects in the energy sector.

While significant progress has been made in recent years, additional assistance is required to meet NDC and LEDS targets. Table 5.6 shows the actions that are prioritised in these plans.

In addition, Table 5.7 details the potential sources of financing for the energy sector in Fiji.

5.2.3 Potential data utilisation and application

SRS data have regularly been used for solar resources in Fiji, using solar radiation satellite data. SRS data have high reliability, and can provide evidence to the Fiji government on the availability of solar resources.

In addition, SRS data can be used to inform the design and monitoring and evaluation (M&E) of energy supply and energy access projects. EO data can transform energy exploration, site planning, asset management and infrastructure monitoring. In particular, SRS data could:

- Identify communities that are not connected to the grid, define suitability for wind and solar energy, and identify suitable areas for grid extension. More specifically, satellite data

43 Author's own analysis.

Table 5.6 Mitigation actions in the energy sector⁴⁴

Action	LEDS 2018	NDC Implementation Roadmap 2018	NDC 2015
Increased RE power generation capacity, with a focus on solar photovoltaic (PV), hydro generation capacity, and sustainable biomass.	x	✓	✓
Grid extension programmes for rural areas to achieve energy access targets.	✓	✓	x
Undertaking full feasibility studies for grid extension and RE power generation projects.	✓	✓	x
Undertaking a grid stability study to investigate the ability of the grid to accept large-scale intermittent renewables, especially solar PV.	✓	x	x
Increased use of sustainable biomass for fuel use.	✓	✓	✓
Continuation of existing plans to research geothermal energy, use biomass and put in place additional hydro capacity.	x	✓	✓
Undertake mapping of RE resources and locations, including a study of biomass resources.	✓	✓	✓
The development and implementation of national standards for energy assets and conditions for their supply (e.g., quality, warranties) should be completed.	✓	✓	x
Achieving improved energy efficiency, including by providing minimum energy performance standards for public buildings and commercial buildings (including hotels and resorts).	✓	✓	x
Providing targeted assistance to tourism operators, agricultural producers and manufacturing energy users, such as mines, where possible, so that their electricity is sourced from renewable energy rather than diesel or heavy fuel oil generators.	✓	✓	x

could be used as a resource for identifying unelectrified areas, ideal siting locations for grid expansion and areas suitable for self-sustaining microgrids, to help in meeting electrification goals.⁴⁵ As a M&E tool, satellite data could be used to determine the level of grid access achieved following a project, and whether energy access targets and goals are being achieved.

- SRS data could also be used for design of hydroelectricity projects, including assessing water quantity and availability, determination of ideal dam locations and reservoir size, and environmental impact from rerouting or damming water, and for monitoring (such as conducting dam safety assessments). It is also possible to use satellite data for assessing geothermal resources across large land areas. While SRS data can be used for solar resource mapping and wind resource mapping, accuracy is often better using other methods (such as ground-based assessments and lidar). SRS data can, however, be used for siting of energy installations, environmental impact assessments and monitoring of construction progress.

⁴⁴ Ibid.

⁴⁵ Leibbrand, A, N Sadoff, T Maslak and A Thomas (2019), 'Using Earth Observations to Help Developing Countries Improve Access to Reliable, Sustainable, and Modern Energy', *Frontiers in Environmental Science*, available at: <https://www.frontiersin.org/articles/10.3389/fenvs.2019.00123/full>

Table 5.7 Key sources of climate financing for the energy sector⁴⁶

Financing instruments	Grants, concessional loans, equity and guarantees (potential to mobilise climate change finance from public and private financing sources).
Financing sources	There is a range of finance sources for the energy sector, including climate funds (e.g. GCF, the Global Environment Fund [GEF], Climate Investment Funds [CIF]), MDBs (e.g. ADB, WB), other multilateral agencies (e.g. UNDP, GGGI, the International Renewable Energy Agency [IRENA]), and bilateral donors (e.g. the New Zealand Ministry of Foreign Affairs and Trade [MFAT], the Australian Department of Foreign Affairs and Trade [DFAT], JICA).

Additional data are also required to improve the strategic planning and design of renewable energy and energy efficiency projects. These include data on household energy access (particularly for remote communities), data on biomass usage (to determine the mix of energy sources) and data on energy efficiency potential (to set realistic targets and begin energy efficiency initiatives).

5.3 Forests and land use

5.3.1 Profile

About 60 per cent of Fiji's land area is covered by forest. The total forest area (1.162 million hectares [ha]) consists of native forest (87%) and plantation forests (13%), which comprise coconut, pine and mahogany plantations. In addition, around 50,000ha are stocked with mangroves, which is assessed in the ecosystems and ecosystem services section. The annual forest loss over the 2006–2016 period was around 2,500ha, and approximately 1,800ha were newly forested over the same period.⁴⁷

While Fiji has the largest remaining intact, unprotected forests in the entire Polynesia–Micronesia biodiversity hotspot, there are significant challenges facing the forestry sector. Native and plantation forests are affected by land-use change for agriculture and residential development, insufficient capacity and legislation, illegal logging, and a lack of monitoring.

The forestry sector is a mitigation priority in the LEDES, NDC Implementation Roadmap and NDC. GoF has prioritised afforestation, developing the '30 million trees in 15 years initiative'. Under the leadership of the Ministry of Forests, the government has committed to replant and nourish 15 million trees by 2032.

The forestry sector can be used for both mitigation and revenue gathering through REDD+

(reducing emissions from deforestation and forest degradation in developing countries) or another programme for international credits. Given the higher financial return of short-term plantation species, such as pine and mahogany, landowners are less likely to plant long-life native species. Therefore, some form of financial incentive would be needed to facilitate the planting of native species, which could result in net negative in emissions to the tune of around 0.7 million tons CO₂ by 2030.⁴⁸

Forest plantations are also sensitive to climate change hazards, including forest fires caused by droughts and heat spells or windbreaks caused by cyclones. The overall sensitivity of the natural forest ecosystems is relatively high, mainly due to population growth and the demand for greater agricultural production for food security, thus leading to deforestation. Forests are also at risk due to soil erosion and landslides from heavy rainfall.

The implementation of forestry and land-use sector projects in Fiji will have a number of co-benefits in addition to GHG emissions reductions. These include:

- Forestry and land-use sector mitigation options, which can promote conservation of biological diversity, both by reducing deforestation and by using reforestation/afforestation to restore biodiverse communities.⁴⁹

⁴⁸ Ibid.

⁴⁹ Smith, P, M Bustamante, H Ahammad, H Clark, H Dong, EA Elsidig, H Haberl, R Harper, J House, M Jafari, O Maser, C Mbow, NH Ravindranath, CW Rice, C Robledo Abad, A Romanovskaya, F Sperling and F Tubiello, '2014: Agriculture, Forestry and Other Land Use (AFOLU)', in O Edenhofer, R Pichs-Madruga, Y Sokona, E Farahani, S Kadner, K Seyboth, A Adler, I Baum, S Brunner, P Eickemeier, B Kriemann, J Savolainen, S Schlömer, C von Stechow, T Zwickel and JC Minx (eds.), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

⁴⁶ Ibid.

⁴⁷ Government of Fiji (2018), Low Emissions Development Strategy.

- Forestry sector projects, which may also support the regulation of the hydrological cycle and protection of watersheds, reduce erosion, and improve soil quality and fertility.⁵⁰
- Economic co-benefits, which could include carbon payments or compensation mechanisms that may provide a new source of finance, particularly for rural communities. Moreover, mitigation payments may help to make production of non-timber forest products (NTFP) economically viable, which would further diversify income at the local level.⁵¹
- Forestry and land-use projects should be well designed to account for potential adverse side-effects, which could include impacts on land tenure and land-use rights, food security through a potential reduction in local food production, water depletion due to irrigation, and economic impacts resulting from decreased employment and household income.⁵²

The forestry sequestration effort in Fiji has proceeded via the REDD+ programme, which commenced in 2009 through the GIZ REDD+ programme, and the endorsement of the National REDD+ Policy by Cabinet in 2010. The REDD+ programme has been working closely with the Fiji Forestry Department, mostly on rehabilitating natural forests. Significant progress has been made over the past decade, including establishing of the national REDD+ Unit in 2014, establishment of a REDD+ benefit-sharing mechanism in 2019, designing and drafting a Forest Reference Emission Level for the 2006–2016 period, and endorsement of the Emission Reductions Program Document (ERPD) by the Forest Carbon Partnership Facility (FCPF) in 2019.⁵³

There are a number of remaining gaps for implementing the REDD+ programme, and achieving emission reductions, including unavailability of reliable data, inadequate legislation and regulation, and a lack of an MRV system at all levels.⁵⁴

5.3.2 Access to climate finance

According to the Snapshot Report, spending in the forestry sector is almost half of the estimated needs, while it is likely that the available cost estimates do not provide a comprehensive accounting of Fiji's forest-related funding needs.

Climate change projects in the forestry sector are mostly linked to the REDD+ programme, with funding for this programme mostly from the World Bank, GIZ, as well as the Fijian government.⁵⁵ Fiji has successfully accessed climate finance through a number of projects in recent years. Key projects have included the following:

- The Coping with Climate Change in the Pacific Island Region project, funded by GIZ, focused on reducing emissions in the forestry sector. The main aim of the programme has been to reverse degradation in the natural forest sector and to encourage afforestation and reforestation, but work has also been done on plantation forests.⁵⁶
- The Nakauvadra community-based reforestation project, which is being implemented by Conservation International (CI). The land in Nakauvadra is owned by communities residing in the adjacent Yaqara Valley. CI has engaged 28 communities to replant trees in 1,135 hectares (2,800 acres) of important habitat, which has involved establishing six community-run tree nurseries.⁵⁷
- Support on REDD+ from the FCPF, which has involved drafting of the Forest Reference Emission Level, assessment of REDD+ benefit sharing, legal analysis, institutional strengthening and building of stakeholder awareness, and forest monitoring systems and safeguard measures.⁵⁸
- In addition, there are also projects with a climate resilient and forestry focus, such as the GEF- and UNDP-funded 'ridge-to-reef' (R2R) project on 'Testing the Integration of

50 Ibid.

51 Ibid.

52 Ibid.

53 REDD+ Fiji, available at: <http://fjireddplus.org/>

54 For further information, see Fiji's REDD+ Readiness Self-Assessment, available at: https://www.forestcarbonpartnership.org/system/files/documents/PC27%202e.%20Fiji%20-Government%20presentation%20on%20R-Package_%20March%202019_0.pdf

55 Government of Fiji (2018), Third National Communication.

56 GIZ (2009), Coping with climate change in the Pacific island region, available at: <https://www.giz.de/en/worldwide/14200.html>.

57 SPREP, available at: <https://pacificdata.org/data/dataset/the-nakauvadra-community-based-reforestation-project-project-design-document-second-edition8143>

58 Forest Carbon Partnership Facility, Fiji, available at: <https://www.forestcarbonpartnership.org/country/fiji>

Table 5.8 Status of climate finance projects in the forestry sector⁵⁹

Financing priorities	Afforestation and reforestation programmes, implementation of climate adaptation actions, development REDD+ institutions and processes, capacity building and training.
Financing status	Limited progress: Strong support provided on REDD+, but additional assistance is needed to achieve afforestation, forest conservation and restoration of degraded forests targets.

Water, Land, Forest & Coastal Management to Preserve Ecosystem Services, Store Carbon, Improve Climate Resilience

and Sustain Livelihoods in Pacific Island Countries'.⁶⁰

Table 5.8 provides an overview of the status of climate finance projects in the forestry sector.

Additional assistance is needed to achieve climate change mitigation and adaptation outcomes in the forestry and land-use sector. Key activities should be aligned with national plans and policies, and could include the actions listed in Table 5.9.

In addition, Table 5.10 below details the key sources of financing for the forestry sector.

5.3.3 Potential data utilisation and application

SRS imagery has been critical in the management of the forestry and land-use sector in Fiji. For example, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) blue

Table 5.9 Mitigation actions in the forestry sector⁶¹

Action	LEDS 2018	Fiji REDD+ Policy
Reduce deforestation and logging emissions, which could involve reduced designation of protected areas and restrictions on land use.	✓	✓
Encourage afforestation and replantation schemes to enhance forest carbon stocks.	✗	✓
Increased productivity of forest plantations, which will involve improved management and financial support.	✓	✓
Achieving forestry and energy/agriculture sector linkages (e.g. biomass electricity generation and biomass residue/biochar).	✗	✓
Implement REDD+ activities, including strengthening institutions, legislation and governance.	✗	✓

Table 5.10 Key sources of climate financing for the forestry sector⁶²

Financing instruments	Grants, REDD+ finance.
Financing sources	Key sources of climate finance could include FCPF, GCF REDD+ Pilot Programme, GEF, the Adaptation Fund (AF), CIF (the forest investment programme), UN agencies (Food and Agriculture Organization [FAO], International Fund for Agricultural Development [IFAD] and UNDP), MDBs (e.g. ADB, WB), NGOs (e.g. Conservation International and International Union for Conservation of Nature [IUCN]), and bilateral donors.

59 Author's own analysis.

60 GEF (2013), R2R: Testing the Integration of Water, Land, Forest & Coastal Management to Preserve Ecosystem Services, Store Carbon, Improve Climate Resilience and Sustain Livelihoods in Pacific Island Countries, available at:

<https://www.thegef.org/project/r2r-testing-integration-water-land-forest-coastal-management-preserve-ecosystem-services>.

61 Ibid.

62 Ibid.

carbon (i.e. carbon that is captured by marine and coastal ecosystems, such as mangrove forests and seagrass meadows) mapping project contributed to the sustainable management and protection of mangroves and seagrasses in Fiji. These new maps assist the Fiji government, to inform comprehensive updated mangrove management plans.

SRS data can be used for measuring and mapping deforestation and afforestation/reforestation changes, which would be useful for designing and monitoring land-use change, forestry and REDD+ activities.⁶³ For example, Fiji applied a semi-automatic process using high-resolution SRS data to count coconut palms within the remote islands.

SRS data has been used in Fiji for assessing forest cover changes, and GoF plans to further utilise SRS for monitoring of forest cover and land-use changes.⁶⁴ The use of SRS for forestry and land-use projects will likely increase in the future; while satellite images (e.g. LANDSAT TM, ASTER and ETM satellite data) could play a key role in monitoring progress on targets to increase forest cover and monitor changes. For the estimation of forest biomass for REDD+ reporting, SRS data is less accurate at present, but new developments in technology, e.g. accurate satellite-based lidar, could improve its prospects.

5.4 Solid waste

5.4.1 Profile

The Fiji government has taken strong actions relating to solid waste management, through developing the National Integrated Waste Management Strategy 2016–2025, adopting legislation, and developing infrastructure and waste management systems. The Department of Environment is responsible for waste management and pollution standards and guidelines, and, under the Local Government Act, city and town councils are responsible for the management of solid waste.

The government has made significant progress in solid waste management, including developing the Naboro landfill, which caters for all the waste generated from Nausori to Sigatoka. There remain key challenges, however, including dumping of

rubbish and burning of household waste. The waste sector is also a source of methane emissions in Fiji.⁶⁵

The GHG emissions in the solid waste sector were 4 per cent of total emissions over the 2006–2011 period. Total methane emissions from the waste sector increased from 3.0Gg in 2006 to 6.5Gg in 2011. The percentage change with respect to 2006 emissions was approximately 30 per cent for the years 2007–2009 and then increased dramatically from 2010 onwards. The Naboro landfill is the only anaerobic landfill in Fiji, which is a major source of methane. Overall, there is limited data on tonnage of solid waste generated and level of solid waste incineration.⁶⁶

The implementation of integrated solid waste management strategies in the LEDS will not only reduce emissions from the waste sector, but will also have a positive impact for climate change adaptation and resilience. Solid waste management systems are at risk due to climate change hazards, including heavy rainfall, flooding, sea-level rise and erosion. Moreover, most of Fiji's solid waste disposal sites have been developed near the sea and are vulnerable to coastal flooding, which could also result in marine pollution.⁶⁷ The NAP prioritised a measure to endorse and implement a comprehensive waste management plan for rural and urban areas, to reduce the impact of pollution on terrestrial and marine ecosystems and the reliance upon landfill as a waste management option.⁶⁸ The recent Climate Vulnerability Assessment (CVA), moreover, highlights the need to improve waste management and processing to reduce pressure on the environment and ecosystems.

What is more, the implementation of waste projects in Fiji will have a number of co-benefits in addition to GHG emissions reductions. These include:

- Achieving broader environmental objectives, such as preventing pollution, mitigating odours, preserving open space and maintaining air, soil and water quality.⁶⁹

63 Food and Agriculture Organization (no date), National Forest Monitoring Systems – Reducing Emissions from Deforestation and Forest Degradation, available at: <http://www.fao.org/redd/areas-of-work/national-forest-monitoring-system/en/>.

64 The Pacific Community (2018), *Forest change detection Fiji*, SPC, Suva.

65 UNGA (2019), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*.

66 Government of Fiji (2018), Third National Communication.

67 Government of Fiji (2018), Low Emissions Development Strategy.

68 Government of Fiji (2018), National Adaptation Plan.

69 Bogner, J, M Abdelrafie Ahmed, C Diaz, A Faaij, Q Gao, S Hashimoto, K Mareckova, R Pipatti, T Zhang (2007) 'Waste Management', in B Metz, OR Davidson, PR Bosch, R Dave, LA Meyer (eds), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

- Green jobs, which may increase due to recycling, although absolute increases in job numbers are expected to be small.⁷⁰

The NDC (2015) includes high-level action on increasing investment in biogas power generation, but no targets are identified. Fiji has ongoing small-scale solid waste projects, including at piggeries and dairy farms in rural communities, and has also previously developed a green energy plant.⁷¹ The green energy plant in Nabou, which utilised the biproducts of the timber and sugar industry, was established, but has subsequently closed due to operational and financial issues.⁷²

Waste minimisation is also a planned intervention, which could result in reduced GHG emissions, particularly for organic waste. In 2017, a fee was introduced for plastic bags to minimise plastic waste. Another planned intervention is the establishment of a Waste Management Authority to provide more efficient, effective and financially viable waste management services to municipal councils. Waste recycling and transfer stations will also be developed in strategic areas around the country.⁷³

5.4.2 Access to climate finance

The GoF has successfully accessed finance for solid waste projects, although these have had a limited climate change component. Recent key projects in the waste sector include the following:

- Fiji has received technical support from PacWaste and PacWastePlus, financed by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP), which aims to ensure the safe and sustainable management of waste.⁷⁴
- J-PRISM II is an ongoing five-year project funded by JICA that commenced in February 2017. JPRISM II is a regional project and targets capacity development of counterparts for the sustainable management of municipal solid waste. In addition, the Korea International

70 Government of Fiji (2018), Low Emissions Development Strategy.

71 Government of Fiji (2018), Third National Communication.

72 *Fiji Sun* (2020), 'Nabou Landowners Claim \$45,000 Owed By Plant', available at: <https://fijisun.com.fj/2020/04/13/nabou-landowners-claim-45000-owed-by-plant/>

73 *Ibid.*

74 SPREP, PacWastePlus, available at: <https://www.sprep.org/pacwaste-plus>

Table 5.11 Status of climate finance projects in the waste sector⁷⁵

Financing priorities	Reducing solid waste emissions, strengthening climate resilience of waste systems.
Financing status	Limited data progress: Additional assistance is needed to achieve mitigation priorities.

Cooperation Agency has also funded research and capacity building to improve waste management in Fiji.

- Domestic finance has also been used to improve the Naboro landfill, build community awareness, and better manage and make use of organic waste.

Table 5.11 provides an overview of the status of climate finance projects in the solid waste sector.

Key options for reducing solid waste sector emissions and building resilience could include the actions outlined below in Table 5.12 (these are aligned to the NDP, LEDS and NAP).

In addition, Table 5.13 details the key sources of financing for the solid waste sector in Fiji.

5.4.3 Potential data utilisation and application

To improve data capture on the quantities of solid waste disposed, it is recommended that weighbridges be installed at all solid waste disposal sites. There is also a need to undertake additional waste audits and research in waste characterisation, to determine the waste composition for Fiji.⁷⁶

While it is possible to calculate methane emissions from landfills using SRS data, this technology is nascent, highly technical and not widely used.⁷⁷ In the future, it may be cost effective to use SRS data for determining the highest emitting solid waste sources, waste disposal patterns and levels of plastic pollution in the ocean. These data could then be used for allocating climate finance and evaluating progress in reducing solid waste emissions.

75 *Author's own analysis.*

76 Government of Fiji (2018), Third National Communication.

77 Delkash, M, B Zhou and R Singh (2016), 'Measuring Landfill Methane Emissions using Satellite and Ground Data', Chapman University, available at: <https://core.ac.uk/download/pdf/215750693.pdf>

Table 5.12 Mitigation and adaptation actions in the waste sector⁷⁸

Action	LEDS 2018	NDC Implementation Roadmap 2018	NDP	NAP
Adopt and implement a '3R' policy, which outlines incentives for achieving improved waste management and controls the type of packaging material entering the country.	✓	✗	✓	✗
Develop waste recycling and transfer stations in strategic areas around the country.	✓	✗	✗	✗
Capture and utilise emissions from Naboro landfill for electricity generation.	✓	✗	✗	✗
Pursue a programme to develop composting facilities, so that organic waste can be composted on a large scale.	✓	✗	✗	✗
Establish piggy and dairy farming biogas projects that address waste management, health and energy needs.	✗	✗	✓	
Complete a detailed study on solid waste composition, and the optimisation of solid waste collection and sorting for the greater Suva area (especially via a resource survey [GIS], processing techniques and logistics planning).	✗	✓	✗	✗
Endorse and implement a comprehensive waste management plan for rural and urban areas, to reduce the impact of pollution on terrestrial and marine ecosystems and the reliance upon landfill as a waste management option.	✗	✗	✗	✓

Table 5.13 Key sources of climate financing for the waste sector⁷⁹

Financing instruments	Grants, concessional loans.
Financing sources	Key sources of climate finance could include EU/SPREP (PacWastePlus), ADB, World Bank, and bilateral donors (e.g. JICA).

5.5 Biodiversity and the natural environment

5.5.1 Profile

Fiji contains diverse natural environments and biodiversity, across terrestrial, freshwater, coastal and marine ecosystems. Fiji has rich biological diversity and a high number of endemic species. Over half (56%) of the country's 1,594 known plant species are endemic, making their conservation a matter of global importance. More than 300 Fijian species are already listed as endangered and many other species are under pressure. Current estimates indicate that 25 per cent of bird species, 12 per cent of mammals,

67 per cent of amphibians and 11 per cent of reptiles are threatened or endangered in Fiji.⁸⁰

Forests comprise over half of the land area of Fiji and are important for environmental, cultural and economic reasons. Forests are being affected by climate change, illegal logging, clearing for agriculture and urban expansion. The removal of mangroves from coastal areas is problematic, as these offer an effective and natural way of protecting the coastline and preventing erosion.⁸¹

While the greatest threats to Fiji's biodiversity and natural environment are human activities, such as

78 Ibid.

79 Ibid.

80 UNGA (2019), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*.

81 Government of Fiji (2017), *National Biodiversity Strategy and Action Plan for Fiji 2017–2024*.

habitat loss, over-exploitation and pollution, climate change exacerbates these challenges. Key risks include an increase to sea-level rise, sea surface temperature and acidification, potentially altering entire coastal and marine ecosystems. Deterioration in the health of coral reefs will have negative impacts on economic growth, food security and livelihoods. The fishing and tourism sectors are at particular risk. Coral bleaching events are already being reported due to rising ocean temperatures and acidification. Mangrove forests are also vulnerable to sea-level rise and other related hazards, and the decline of mangroves will have implications for coastal management, disaster management and food security.⁸² Vulnerability to sudden-onset events such as cyclones is also a major issue for biodiversity and the natural environment. Tropical Cyclone Winston – a Category 5 cyclone that devastated Fiji in February 2016 – caused damage that included fallen trees and extensive loss of foliage, uprooting of hard corals, and extensive death of fish and other marine life.⁸³

Ecosystem degradation and loss have far-reaching implications due to the services they provide, ranging from supporting livelihoods to protection from coastal hazards. Ecosystems can be interpreted as 'green infrastructure' – for example, the loss of coral reefs will result in greater wave energy reaching shorelines and reduced sediment production, increasing coastal erosion. It has been estimated that for Viti Levu alone, projected costs due climate change impacting coral reefs could reach US\$5–14 million annually by 2050. The total services supplied by marine ecosystems have been estimated at F\$2.5 billion each year, with projected loss by 2050 of F\$2 billion.⁸⁴

Therefore, the implementation of biodiversity and natural environment projects in Fiji will have a number of co-benefits. These include:

- Restored natural shorelines with mangroves and protecting coral reefs, which can form a buffer against storm surges and create nurseries for fisheries.
- Protecting groundwater recharge zones and restoring catchments, which can secure water resources so that entire communities can cope with drought.

82 Government of Fiji (2018), National Adaptation Plan.

83 Ibid.

84 Ibid.

- Maintaining ecosystems, which can also reduce the exposure of assets and systems, such as road networks and agricultural production, to climate hazards, including flooding and erosion.

The National Biodiversity Strategy and Action Plan (NBSAP) for Fiji 2017–2024 includes a number of measures for addressing climate change, which are shown in Table 5.15. Fiji also has a wide range of laws and policies that contribute to the establishment and management of terrestrial and marine protected areas. However, substantial amendments or new legislation are required to provide an effective framework for establishing and managing protected areas.⁸⁵

5.5.2 Access to climate finance

In recent years, Fiji has successfully accessed climate finance through a number of projects focused on strengthening ecosystems and ecosystem services. This includes the following initiatives:

- The Regional Pacific Ecosystem-based Adaptation to Climate Change project, which has built capacity for developing and implementing ecosystem-based adaptation (EbA) approaches and has undertaken studies on mapping EbA, prioritising options and implementing demonstration projects (financed by the International Climate Initiative).⁸⁶
- Implementing a 'Ridge to Reef' Approach to Preserve Ecosystem Services, Sequester Carbon, Improve Climate Resilience and Sustain Livelihoods in Fiji (financed by the GEF Trust Fund and UNDP).⁸⁷
- Bilateral climate finance from other development partners on biodiversity and ecosystem projects.

The Snapshot Report found that the total available public climate finance for Fiji's blue economy from

85 Government of Fiji (2018), National Adaptation Plan.

86 SPREP, 'About PEBACC', available at: <https://www.sprep.org/pebacc>

87 GEF (2013), Implementing a 'Ridge to Reef' Approach to Preserve Ecosystem Services, Sequester Carbon, Improve Climate Resilience and Sustain Livelihoods in Fiji (Fiji R2R), available at: <https://www.thegef.org/project/implementing-ridge-reef-approach-preserve-ecosystem-services-sequester-carbon-improve>

2016 to 2019 was estimated at F\$72.3 million annually, including F\$15.2 million on fisheries and almost F\$58 million on coastal ecosystems. *The Snapshot Report*, however, does not provide information on climate finance flows for projects on terrestrial and freshwater ecosystems and ecosystem services.

Approximately nine projects have been funded by climate finance between 2016 and 2018 to address issues in the ecosystem and ecosystem services sector. Table 5.14 provides an overview of the status of climate finance projects in the ecosystem and ecosystem services sector.

While Fiji has implemented a number of successful projects related to ecosystems and ecosystem services, further assistance is required. Future

Table 5.14 Status of climate finance projects in the ecosystem and ecosystem services sector⁸⁸

Financing priorities	Building climate resilience of ecosystems, scaling up of demonstration projects, undertaking further research to inform responses.
Financing status	Limited data progress: Further assistance is needed to achieve the NBSAP 2017–2024 and NAP 2018 outcomes.

priorities could include the actions (these are aligned with the NBSAP 2017–2024 and the NAP) listed in Table 5.15.

Table 5.15 Adaptation actions to achieve biodiversity and natural environment outcomes⁸⁹

Action	NBSAP 2017–2024	NAP 2018
Prioritise and delineate critical areas for protection and sustainable management, based on ecosystem services, cultural importance, biodiversity, food security, water security, access and benefit sharing, and importance for adaptation and disaster risk reduction.	✓	✓
Gain endorsement of mangrove management plan, implement mangrove rehabilitation projects, and strengthen the regulations regarding mangrove removal and conversion.	✓	✓
Assess and monitor the state of coastal ecosystems and protect and enhance the natural coastal defences.	✓	✓
Integrate ecosystem-based adaptation measures to restore degraded habitats and construction of seawalls and river banks, including mangrove planting.	✗	✓
Implementation of river bank protection activities, which integrate ecosystem-based approaches with hard infrastructure, in particular, the use of riparian buffers. ⁹⁰	✗	✓
Assess and monitor the state of coastal ecosystems and protect and enhance the natural coastal defences.	✓	✓
Expand the 'tree-planting campaign' to encourage voluntary tree and/or mangrove planting activities, which are to be conducted as a part of school curriculums, community stewardship and corporate social responsibility.	✗	✓
Identify and map 'climate-vulnerable' species of flora and fauna and their habitat (lifecycle), including connections with the need to control invasive species, and create a national plan and monitoring system to support climate-vulnerable species.	✓	✓
Strengthen the management and monitoring of ecosystems (including of rivers and watersheds).	✓	✓
Integrate traditional ecological knowledge, innovations and good practices of Fijian communities into conservation and sustainable use of biodiversity.	✓	✗

⁸⁹ Ibid.

⁹⁰ A riparian buffer is a vegetated area near a stream that helps to protect the stream from the impact of adjacent land uses.

⁸⁸ Author's own analysis.

Table 5.16 Key sources of climate financing for the ecosystem and ecosystem services sector⁹¹

Financing instruments	Grants.
Financing sources	Key sources of climate finance could include GCF, GEF, AF, UNDP, FAO, SPREP, The Pacific Community (SPC), NGOs (e.g. Conservation International and IUCN), and bilateral donors (e.g. EU, Government of France, Government of Germany).

In addition, Table 5.16 details the key sources of climate finance for the ecosystem and natural environment projects in Fiji.

5.5.3 Potential data utilisation and application

Fiji has utilised data to monitor the status of biodiversity and the natural environment. For example, Fiji has utilised EO data for monitoring changes in mangrove areas. According to the NBSAP 2017–2024, data on the status of coral reef ecosystems are also considered reliable and consistent for Fiji. Very limited data are available on the status of endemic plants, nor on the biology and ecology of Fiji's threatened species more generally.

SRS data are useful for monitoring and promoting the protection of ecosystems and biodiversity from climate change impacts. The technologies for using SRS data for monitoring and understanding the status of biodiversity and the natural environment are progressing rapidly, and these are expected to become one of the most cost-effective ways to identify ecosystems and biodiversity at risk from changes in climatic conditions.⁹²

SRS data can be used to monitor the impact of climate change on particular types of ecosystems, such as forest and riparian ecosystems, including through data such as habitat quality, vegetarian

91 Author's own analysis.

92 Luque, S, N Pettorelli, P Vihervaara and M Wegmann (2018), 'Improving biodiversity monitoring using satellite remote sensing to provide solutions towards the 2020 conservation targets', available at: <https://besjournals.onlinelibrary.wiley.com/doi/10.1111/2041-210X.13057>

indices and estimation of evapotranspiration.⁹³ EO data can be used to identify where the most critical changes are taking place, thereby highlighting the biggest threats to ecosystems and biodiversity. This can act as an early warning system and inform where interventions should be focused.⁹⁴

5.6 Livelihoods and disaster risk reduction

5.6.1 Profile

Fiji regularly experiences disasters of hydro-meteorological origin, which have widespread and devastating impacts to the communities of Fiji. Natural disasters affected 3.3 million people between 1970 to 2016, with the majority of people impacted by tropical cyclones (TCs), severe storms and floods.⁹⁵ Climate change is expected to increase the severity of natural disasters, which will have massive consequences for economic activity, livelihoods and well-being.

Over the past decade, there have been major disasters due to natural hazards, causing loss of life and resulting in severe impacts on the economy. The most severe impacts for Fiji are TCs, particularly in coastal areas, with the estimated average annual asset losses amounting to F\$152 million (accounting for 1.6% of GDP).⁹⁶

Over the past four decades, there has been a decreasing trend in the number of TCs, yet recent seasons have produced the most severe cyclones in the region: Cyclone Pam and Cyclone Winston. This is consistent with the climate change projections for tropical cyclones, which suggest that while the total number of tropical cyclones affecting the Pacific region is likely to decrease through this century, the proportion of more severe tropical cyclones may increase.⁹⁷

93 World Bank (2019), *Global Water Security and Sanitation Partnership: New avenues for remote sensing applications for water management*, available at: <https://documents1.worldbank.org/curated/en/810581561961939655/pdf/New-Avenues-for-Remote-Sensing-Applications-for-Water-Management-A-Range-of-Applications-and-the-Lessons-Learned-from-Implementation.pdf>

94 Anderson, C (2018), 'Biodiversity monitoring, earth observations and the ecology of scale', *Journal of Ecology Letters*, Vol 21 No 10, available at: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/ele.13106>

95 Government of Fiji (2018), Third National Communication.

96 Ibid.

97 Government of Fiji (2018), National Adaptation Plan.

Cyclone Winston devastated Fiji, resulting in the loss of 44 lives and 40,000 people requiring immediate assistance, and the destruction of entire communities and infrastructure. The storm caused the damage or destruction of about 30,300 houses, 495 schools, and 88 health clinics and medical facilities, and had severe impacts on crops and livestock (compromising the livelihoods of about 60% of the nation's population).⁹⁸

As demonstrated by Cyclone Winston, natural disasters can impact livelihoods and the well-being of communities and can threaten the survival of sociocultural systems. The displacement of communities, both temporary and permanent, can result in serious impacts on the security, health and well-being of individuals. Both slow-onset disasters (e.g. environmental degradation and sea-level rise) and sudden-onset disasters (e.g. TCs and floods) can result in livelihood impacts and community displacement. Displacement often has multiple causes, including climate change hazards, environmental and socioeconomic drivers (e.g. population changes), and policy and regulatory challenges (e.g. inadequate urban planning). Rural communities along the coast are particularly vulnerable and, in 2013, the village of Vunidogolua in Vanua Levu became the first village to be relocated in Fiji.⁹⁹

As a significant proportion of livelihoods in Fiji are dependent on the natural capital-intensive agriculture and tourism sectors, livelihoods are highly exposed to climate change hazards. In addition, low-income and otherwise disadvantaged groups are disproportionately exposed, and are often much more affected by climate hazards impacting on the natural environments.¹⁰⁰

Vulnerability to natural shocks depends on socioeconomic characteristics, such as access to savings and insurance, and also the ability of the government to recover. In order to build resilient livelihoods, the exposure and vulnerability of risks needs to be understood, and response plans must be developed to address risks. The completion of Fiji's first ever CVA in 2017 resulted in a strengthened understanding of Fiji's risk profile and a number of strategies to enhance Fiji's resilience to geophysical and climate-related hazards. These strategies are also reflected in the National

Adaptation Plan. Therefore, the GoF has made substantial progress in building understanding and strengthening planning, but further assistance is needed to implement actions and measures to achieve resilience.¹⁰¹

To reduce the social and economic impact of disasters, Fiji has established early warnings systems (EWSs) and has designated about 800 emergency evacuations sites for communities across the country – although further strengthening of these systems is required. The Fiji Meteorological Service (FMS), the Hydrology Division (part of FMS), the Seismology Section (under the Mineral Resources Department) and National Disaster Management Office (NDMO) are key agencies that are responsible for early warning and preparedness.¹⁰²

The implementation of projects that safeguard livelihoods and achieve disaster risk reduction will have wide-ranging benefits. These include:

- Reducing losses of lives and property and minimising environmental damage, by expanding the coverage of EWSs. Investing in EWSs can also result in benefits to the private sector – firms involved in agriculture, power production, aviation and mining all have a large interest in being warned about weather phenomena such as strong winds or lightning, and being able to maintain regular water flow.¹⁰³
- Interventions in other sectors that reduce the exposure of people, households, buildings and assets to climate hazards, which may result in wide-ranging co-benefits. For example, afforestation of land may reduce risks due to flood and landslides, and this will also have benefits from GHG emissions reductions and the potential of harvesting NTFPs.
- Actions across all sectors, which should be articulated to benefit the community and livelihoods regardless of how climate change materialises. This is referred to as a 'low regret' intervention, suggesting that there are little or

98 Government of Fiji (2018), Third National Communication.

99 Government of Fiji (2018), National Adaptation Plan.

100 Ibid.

101 Government of Fiji (2017), Climate Vulnerability Assessment.

102 Ibid.

103 International Federation of Red Cross and Red Crescent Societies (2013), *A guide to mainstreaming disaster risk reduction and climate change adaptation*, Geneva, Switzerland.

no regrets in implementing an intervention in the future, which will still be beneficial despite climate change and its future implications.¹⁰⁴

The Republic of Fiji National Disaster Risk Reduction Policy (NDRRP) 2018–2030 outlines the policy objectives for preventing and reducing disaster risk. Reducing disaster risk and building climate resilient livelihoods requires a multisectoral and holistic response across government, which includes the development of climate-resilient agricultural systems and infrastructure, strengthened institutional co-ordination and policy design, and increased access of households to finance and insurance. Disaster management policies for Fiji are formulated by the National Disaster Management Council (NDMC).

The overall policy goal for NDRRP is for stronger disaster risk governance and disaster risk reduction measures to support poverty alleviation, as part of the overall national effort towards sustainable resilient development. The policy is guided by seven policy strategies, which are outlined in Table 5.17.

5.6.2 Access to climate finance

A large quantum of climate finance has been allocated towards building resilient communities and reducing disaster risk in Fiji.

According to the Snapshot Report, an average of F\$779 million annually was allocated to hazard management between 2016 and 2019, and at least F\$197 million was actually spent. This spending was heavily skewed toward investments related to responding to and recovering from Tropical Cyclone Winston, which accounted for 73 per cent of all actual spending in this sector. Between 2016 and 2019, F\$163 million was invested into projects that were not directly related to Tropical Cyclone Winston. These projects focused on a range of activities, from building cyclone-proof emergency shelters to upgrading or maintaining early warning and climate information systems.

The country has successfully accessed climate change finance for strengthening DRR outcomes and safeguarding climate resilient livelihoods from a range of sources. This includes the following projects:

Table 5.17 NDRRP policy strategies

Policy Strategy	Overview
Mainstreaming DRR	Involves mainstreaming disaster risk reduction (DRR) into every level of governance arrangement, development initiatives and budget arrangements. This will ensure that the core principles of DRR are mainstreamed into decision-making, policies and legal frameworks, so Fiji's national vision and development goals are not hindered by disasters. This will also ensure that DRR principles are operable at all levels of government and society.
Disaster risk governance	Risk governance applies the principles of governance to the identification, assessment, evaluation and communication of risks. Strengthening disaster risk governance in preparedness, response, recovery and reconstruction is necessary, and fosters collaboration and partnership across disaster risk governance mechanisms and institutions for DRR and sustainable development.
Financing and investing	Refers to ensuring sufficient proactive investment in DRR measures within the annual budget.
Preparedness	Refers to ensuring strong processes and co-ordination for preparedness, which are activated through structural and non-structural measures.
Emergency response	Involves a well-co-ordinated humanitarian emergency response, utilising the disaster risk information system.
Recovery and reconstruction	This means 'building back better', insuring the inclusion of disaster risk governance in recovery and reconstruction.
Knowledge and information	Refers to ensuring improved knowledge, information, attitudes and practices among people, so they can respond and reduce disaster risk.

104 Government of Fiji (2018), Third National Communication.

- The 'Increasing the resilience of informal urban settlements in Fiji that are highly vulnerable to climate change and disaster risks project' (financed by the Adaptation Fund and implemented by UN-Habitat).¹⁰⁵
- Implementing a 'Ridge to Reef' Approach to Preserve Ecosystem Services, Sequester Carbon, Improve Climate Resilience and Sustain Livelihoods in Fiji (financed by GEF Trust Fund and UNDP).¹⁰⁶
- Bilateral support from the New Zealand Ministry of Foreign Affairs and Trade (MFAT) to increase the disaster resilience of vulnerable Fijian communities, through strengthening early warning systems in Suva, improving community evacuation centres and increasing the capacity of the National Disaster Management Office.
- Humanitarian support, including for reconstruction and rehabilitation following natural disasters, such as Cyclone Winston in 2016.
- The Fijian government is also rebuilding all the damaged school buildings, so that they meet the specifications required to withstand a Category 5 cyclone, to shield the country and its budget from the same scale of damage during the next Winston-like event.

The Snapshot Report has found that there is a significant gap between estimated needs and actual spending levels, and that the annual expenditures over 2016–2019 on non-Winston-related disaster risk management actions represented only 19 per cent of annual financing needs. Table 5.18 provides an overview of the status of climate finance projects in the livelihoods and disaster risk reduction sector.

Further assistance is required to strengthen livelihood resilience and build disaster risk reduction. This could include the key actions listed in Table 5.19 from the NAP 2018, CCVA and the National Disaster Risk Reduction Policy (NDRRP).

105 Adaptation Fund (2017), Enhancing urban resilience to climate change impacts and natural disasters: Honiara, available at: <https://www.adaptation-fund.org/project/enhancing-urban-resilience-climate-change-impacts-natural-disasters-honiara-3/>

106 GEF (2013), Implementing a 'Ridge to Reef' Approach to Preserve Ecosystem Services, Sequester Carbon, Improve Climate Resilience and Sustain Livelihoods in Fiji (Fiji R2R), available at: <https://www.thegef.org/project/implementing-ridge-reef-approach-preserve-ecosystem-services-sequester-carbon-improve>

Table 5.18 Status of climate finance projects in the livelihoods and disaster risk reduction sector¹⁰⁷

Financing priorities	Strengthened early warning systems, improved evacuation centres and routes, strengthened institutional frameworks, and increased support to building climate-resilient livelihoods.
Financing status	Limited progress: Further assistance is needed to achieve NAP, CVA and NDRRP objectives.

In addition, Table 5.20 details the key sources of financing for the livelihoods and disaster risk reduction sector in Fiji.

5.6.3 Potential data utilisation and application

The Ministry of Land and Mineral Resources has full capacity in-house to conduct photogrammetry and regularly acquires aerial photo imageries covering the entire country for land information updates on topographic details. The ministry engages New Zealand Aerial Mapping for the acquisition of coloured aerial photos at 1:20,000 scale.

SRS data can be further utilised to forecast climate hazards, particularly in relation to flooding, extreme events (such as tropical storms and cyclones), and drought. These data can be used to provide early warnings to households, farmers and other stakeholders. The provision of early warnings is beneficial, due to the reduction in damages and negative impacts (including loss of life) associated with climate change-induced disasters. SRS data can also support the identification of evacuation routes for communities, and evaluate roads and key facilities to confirm their usability post-disaster.¹⁰⁸

For cyclone and flood damages (e.g. Cyclone Winston), Fiji has used rapid damage mapping tools. For example, a web-based information portal can be developed and made accessible to all relief agencies, government and non-government organisations (NGOs) in the immediate aftermath

107 *Author's own analysis.*

108 European Space Agency, EO4SD Agriculture and Rural Development cluster (2019), Final Report on Earth Observation for Sustainable Development in Agriculture and Rural Development.

Table 5.19 Adaptation actions to achieve resilient livelihoods and disaster risk reduction¹⁰⁹

Action	NAP 2018	CVA	NDRRP
Ensure that every rural community and every rural school has at least one building resilient to a Category 4 cyclone.	✓	✓	✓
Create flood risk and management action plans for all human settlements, which operate at the catchment scale and involve either hybrid or nature-based solutions and payments for ecosystems services.	✓	✓	✗
Implement adaptation actions to reduce coastal and inland flood exposure and risks through coastal and river protection.	✓	✓	✓
Implement landslide protection measures.	✓	✓	✓
Conduct regular river-flow monitoring and flood forecasting.	✓	✓	✗
Elaborate on drought management plans.	✓	✓	✓
Ensure disaster risk reduction and disaster management response plans are developed for all urban centres. These plans should address issues such as early warning systems, inter-agency co-ordination and the disaster response capacity of key agencies.	✓	✗	✗
Complete hazard mapping and surveying.	✓	✓	✓
Invest in drone technology to assist with post-disaster assessments.	✗	✓	✗

Table 5.20 Key sources of climate financing for the livelihoods and disaster risk reduction sector¹¹⁰

Financing instruments	Grants.
Financing sources	Key sources of climate finance could include GCF, GEF, AF, CIF, UNDP, World Bank, ADB and bilateral donors (e.g. DFAT and MFAT).

of a natural disaster.¹¹¹ Making factual spatial information available as soon as possible is fundamental to aiding an efficient and effective natural disaster response and recovery. The National Disaster Management Office (NDMO) maintains all its data in a GIS portal.

Collection of SRS and imagery data (including through the use of drones) can support precise post-disaster needs assessments and evaluation of early and long-term recovery needs and priorities.

109 Ibid.

110 Ibid.

111 For further information, see: iRevolutions (2016), 'UN Crisis Map of Fiji Uses Aerial Imagery (Updated)', available at: <https://irevolutions.org/2016/03/04/un-crisis-map-fiji/>

This includes the allocation of humanitarian assistance following a disaster, by identifying the most at-need communities and prioritising infrastructure repair.

Another application is the use of SRS data for index-based drought or flood insurance, where insurance premiums and pay-outs are based on a predetermined index derived from EO data, rather than on actual crop and livestock losses. Index insurance is used as a risk management tool in agriculture, food security and disaster risk reduction, and helps stabilise income for smallholders when yields are affected by weather.⁹¹

In addition, Fiji's rural communities have a wealth of traditional knowledge to prepare for extreme events, and this information should also be shared among communities to build climate resilience.

5.7 Resilient infrastructure

5.7.1 Profile

Infrastructure is critical to other adaptation efforts, including in the relocation of communities, agricultural development, and strengthening of climate information management and services. Across Fiji, infrastructure is mostly situated in coastal and flood plain areas, making it vulnerable to

hazards such as sea-level rise, tidal surges, flooding and coastal erosion, and inadequate infrastructure contributes to a range of adverse impacts.¹¹²

Coastal hazards are of particular concern, as approximately 90 per cent of people live on the coast, mostly along the Suva-Lami-Nasinu-Nausori, Nadi-Lautoka-Ba, and Weilevu-Labasa-Nasea urban corridors, and these areas are where almost all industry is located. Urban centres, where much of population growth is occurring, are also highly exposed to seaborne and riverine natural hazards, cyclones, storm surges, coastal and riverine erosion, landslides, floods, and already occurring sea-level rise due to climate change. Nadi is at high flood risk, and is of particular concern and focus because of its commercial and tourism importance, and as well as because it contains the country's largest airport.¹¹³

Rural communities residing along the coast are vulnerable to sea-level rise, storm surges, cyclones and coastal erosion. Some coastal villages have reported shoreline retreats of 15–20 meters over recent decades, in part due to the loss of mangroves.¹¹⁴ There is a lack of climate-resilient housing across the country and an inadequate level of insurance coverage of housing stock. Most households cannot afford house insurance and, consequently, must rebuild homesteads with limited personal savings and debt.

Infrastructure in Fiji is already subject to high risks, as illustrated by the impacts of Cyclone Winston, which struck the country in February 2016, with massive consequences for economic activity, livelihoods and well-being. Since Cyclone Winston, the government has started various projects to further reduce Fiji's vulnerability, including establishing the Construction Implementation Unit to ensure reconstruction in the education and health sectors is carried out with higher resilience standards.¹¹⁵

Over the last decade, improvements in infrastructure management have contributed to reducing vulnerability to natural disasters. But there remains a need to integrate climate resilience measures into key infrastructure, including housing and the urban built environment. Achieving infrastructure resilience requires cross-sectoral action and collaboration to enable opportunities and

risks to be identified between sectors, including the co-ordination of emergency planning and disaster management in the event of infrastructure failure.¹¹⁶

The development of resilient infrastructure in Fiji will result in a number of co-benefits. These include:

- Increased reliability of service provision. Reliable infrastructure has benefits ex-post, by reducing the frequency and severity of disruption. It also has benefits ex-ante, as it reduces the need for users to invest in backup measures.¹¹⁷
- Adaptations producing development co-benefits in urban areas, including safer, healthier and more comfortable urban homes and environments and reduced vulnerability for low-income groups to disruptions in their incomes and livelihoods.¹¹⁸

The 5-Year National Development Plan outlines the strategy for infrastructure investment in Fiji, and it includes goals and targets and a pipeline of projects and programmes to build climate change resilience. The NAP, LEDS and NDC Implementation Roadmap, moreover, are also aligned to the NDP, and provide pathways for the development of low-emissions climate-resilient infrastructure. The CCVA assesses the risks of climate change to infrastructure, and it also provides a list of priority interventions to strengthen resilience.

5.7.2 Access to climate finance

Fiji has successfully accessed climate change finance from a range of sources. This includes the following projects:

- The 'Increasing the resilience of informal urban settlements in Fiji that are highly vulnerable to climate change and disaster

116 Government of Fiji (2017), Climate Vulnerability Assessment.

117 OECD (2018), *Climate-resilient Infrastructure*. OECD Environment Directorate.

118 Revi, A, DE Satterthwaite, F Aragón-Durand, J Corfee-Morlot, RBR Kiunsi, M Pelling, DC Roberts and W Solecki (2014), '2014: Urban areas', in CB Field, VR Barros, DJ Dokken, KJ Mach, MD Mastrandrea, TE Bilir, M Chatterjee, KL Ebi, YO Estrada, RC Genova, B Girma, ES Kissel, AN Levy, S MacCracken, PR Mastrandrea and LL White (eds.), *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 535–612.

112 Government of Fiji (2018), National Adaptation Plan.

113 Ibid.

114 Ibid.

115 Government of Fiji (2018), Third National Communication.

risks' project (financed by the Adaptation Fund and implemented by UN-Habitat). This project focuses on informal settlements across four urban areas and towns in Fiji: Lautoka, Sigatoka, Nadi and Lami, which are located in the Greater Suva Urban Area.¹¹⁹

- The Coastal Community Adaptation Project, which is a regional project funded by the US Agency for International Development (USAID) to increase local knowledge and adaptive capacity through community-based training.¹²⁰
- Climate Change Vulnerability Assessments, which focus on the communities and the built environment (including the first national assessment supported by the World Bank and a UN-Habitat-supported assessment for Lami Town).

The Snapshot Report does not provide data on climate finance flows to resilient infrastructure projects. Data on infrastructure investments are instead captured in the data provided on the disaster risk management, transportation, and the water and sanitation sectors.

The Snapshot Report does, however, include an analysis of climate finance flows into the housing sector. It was found that overall spending in the housing sector was nearly half the cost estimates provided in the CVA.

Table 5.21 provides an overview of the status of climate finance projects in the resilient infrastructure sector.

Further assistance is required to develop climate resilient infrastructure, which could include the actions listed in Table 5.22.

In addition, Table 5.23 details the key sources of financing to develop climate resilient infrastructure.

Table 5.21 Status of climate finance projects related to climate resilient infrastructure¹²¹

Financing priorities	Building and upgrading infrastructure and buildings (including housing), reducing risk from floods and coastal hazards to human settlements and the built environment, improving understanding of infrastructure exposure and vulnerability.
Financing status	Limited progress: Additional support is required to achieve NAP priorities.

5.7.3 Potential data utilisation and application

The open street map of Fiji is the most up to date within the Pacific, covering 90 per cent of the buildings, roads, land use and waterways in Viti Levu and Vanua Levu islands. Moreover, a recent probabilistic tsunami hazard exposure map covered most of the infrastructure within Fiji.¹²²

EO data can provide an improved understanding of the built environment, including urbanisation and settlement trends, population changes, and changing infrastructure and transport needs. This data can provide information on the spatial location of buildings and infrastructure in urban and peri-urban areas, and the impact of heavy rainfall and sea-level rise and associated inland and coastal flooding and landslides on these assets.¹²³

EO data can also measure changes in deformation of buildings and infrastructure, with applications for geophysical monitoring of subsidence and structural stability. Another potential use is determining the area of impervious surfaces, which is related to the risk of urban floods, the urban heat island phenomenon, as well as the reduction of ecological productivity.¹²⁴

119 Adaptation Fund (2017), Increasing the resilience of informal urban settlements in Fiji that are highly vulnerable to climate change and disaster risks, available at: <https://www.adaptation-fund.org/project/increasing-resilience-informal-urban-settlements-fiji-highly-vulnerable-climate-change-disaster-risks-2/>
 120 ReliefWeb (2016), Coastal Community Adaptation Project, available at: <https://reliefweb.int/report/fiji/coastal-community-adaptation-project>

121 *Author's own analysis.*
 122 Probabilistic Tsunami Hazard and Exposure Assessment for Fiji, available at: <http://www.pacifictsunami.online/>
 123 World Bank and OECD (2019), World Bank national accounts data, and OECD National Accounts data files, World Bank.
 124 The urban heat island phenomenon occurs due to the replacement of natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat.

Table 5.22 Adaptation actions to achieve climate resilient infrastructure¹²⁵

Action	NAP 2018
Reduce infrastructure risk through ecosystem based adaptation approaches.	✓
Flood management activities for priority river systems, such as Nadi River, Sigatoka River, Rewa River, Labasa River.	✓
Improve and maintain drainage networks in urban and rural areas as measures to protect against inland floods, considering that drainage defects are the dominant cause of floods.	✓
Landslide protection measures (including eco-based adaptation measures).	✓
Prioritise a Flood Risk Management Action Plan for high-risk towns.	✓
Integrate environmental and climate risks into the new development of residential lots by the Housing Authority.	✓
Scale up efforts to upgrade existing informal settlements.	✓
Provide affordable serviced land close to employment nodes for households across all income brackets, to meet existing housing backlog and future urban growth (including additional rural–urban migration, which is expected to increase due to climate change).	✓
Develop and support the construction of cost-effective and context-relevant disaster resilient model homesteads for both rural and urban communities.	✓
Strengthen and promote the enforcement of appropriate national building codes and infrastructure design on critical facilities and public assets.	✓
Develop a national infrastructure asset management system, which assesses the condition of infrastructure and public buildings and prioritises and provides guidance for their maintenance and upgrade.	✓
Develop a national-level systematic strategy that can identify and prioritise communities for relocation based upon vulnerability maps, guide subsequent relocation efforts, identify and fulfil capacity-building needs of communities once relocated, as well as incentivise and fund relocation of communities.	✓
Preparation of 'Guided Urban Growth Management Plans' and 'Guided Strategic Land Development Plans', which use zoning and buffer zones to support municipal governance and investment – by encouraging settlement and development away from vulnerable areas, based upon full utilisation of relevant hazard maps and long-term climate projections.	✓
Implement progressive structural upgrading of all remaining schools not affected by Cyclone Winston – Phase I & Phase II.	✓
Create flood risk and management action plans for all human settlements, which operate at the catchment scale and involve either hybrid or nature-based solutions and payments for ecosystems services.	✓

Table 5.23 Key sources of climate financing related to resilient infrastructure¹²⁶

Financing instruments	Grants, concessional loans.
Financing sources	Key sources of climate finance could include GCF, GEF, AF, CIF, UNDP, World Bank, ADB and bilateral donors (e.g. DFAT, MFAT, KOICA and JICA)

125 Ibid.

126 Ibid.

These data can then be used to inform planning strategies, enable authorities to properly prepare for natural hazards, and undertake decision-making on allocation of climate finance to build infrastructure resilience and initiate prevention measures.

5.8 Food security and nutrition

5.8.1 Profile

The agricultural sector is the third-largest economic sector in Fiji, contributing an estimated 10.4 per cent of GDP.¹²⁷ The fisheries industry is also one of Fiji's key resource-based sectors, and in 2015 it contributed around 1.8 per cent to GDP.¹²⁸ About 37 per cent of the households in Fiji derive some form of income from agriculture, with a large number of people also relying on subsistence farming for their livelihoods and to meet dietary requirements.¹²⁹ While resilience to climatic conditions is a relatively high for traditional crops and production systems, there has been decline in traditional farming practices in recent decades.

Fisheries are also vital to fulfilling Fijians right to food, and subsistence and commercial fisheries play an important role in contributing to the national economy. Fisheries face multiple pressures, including climate change, pollution and overharvesting. The viability of nearshore fisheries is inextricably tied to the future of sea grasses, mangroves and coral reefs – which are among the most vulnerable ecosystems to climate change.¹³⁰

There has been a significant decline in the area of land being used for farming since 1990, with the largest declines relating to sugar cane farming and copra (coconut) production. Fiji is now importing a larger proportion of its food supply, which also generally has higher greenhouse gas emissions.¹³¹ Climate change will impact food systems, with

the UNGA report on the state of the environment noting that Fiji has experienced decreased food security in recent years.¹³²

Climate change poses significant problems for food and nutrition security in Fiji. Much of the prime land for agriculture is in coastal areas, which are affected by sea-level rise, tidal surges and salinity intrusion.¹³³ Additionally, soil erosion from extreme precipitation events (including riverbank erosion) results in much of the country's topsoil being lost, which has significant implications for long-term food and nutrition security. Inland flooding can also have detrimental effects, which includes crop damage due to inundation. In the last 16 years, the agriculture sector has suffered economic damages and losses from cyclones and floods amounting to about F\$791 million.¹³⁴ Cyclones in particular can cause destruction to crops, trees, farming and fishing equipment, and related infrastructure, as well as the death of livestock and destruction of the reef ecosystems that support fisheries. These damages can lead to negative impacts on food security, economic development and the health of the population as a whole.¹³⁵

The Fiji 2020 Agriculture Sector Policy Agenda compliments the National Green Growth Framework by identifying climate smart agricultural innovations that generate both adaptation and mitigation benefits and productivity improvements. The Agriculture Sector Policy provides an inclusive development framework for the agricultural sector to address new domestic and global challenges, in line with food and nutrition security, climate change, feedstock for renewable energy, the utilisation of water resources for aquaculture, agriculture export, and the rehabilitation of its traditional agriculture export industries: the sugarcane and the coconut industries.

The key national agriculture objectives include transitioning the agricultural sector in Fiji to an organised system of producing, processing and marketing crops, livestock and aquaculture products; developing an integrated production, processing, energy and transport infrastructure support system for agriculture; and improving delivery of agriculture support services. In support

127 Pacific Agriculture Policy Project, The Fiji Agriculture Policy Bank, available at: <https://pafpnet.spc.int/policy-bank/countries/fiji>

128 FAO, Fishery and Aquaculture Country Profiles: The Republic of Fiji, available at: <http://www.fao.org/fishery/facp/FJI/en>

129 Fiji Department of Agriculture (2009), National Agriculture Census Report, available at: http://www.fao.org/fileadmin/templates/ess/ess_test_folder/World_Census_Agriculture/Country_info_2010/Reports/Reports_3/FJI_ENG_REP_2009.pdf.

130 Government of Fiji (2018), National Adaptation Plan.

131 UNGA (2019), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*.

132 Ibid.

133 Government of Fiji (2018), National Adaptation Plan.

134 Government of Fiji (2020), Third National Communication.

135 Secretariat of the Pacific Regional Environment Programme (2013), *Fiji's State of Environment Report*.

of energy infrastructure development, agriculture products in Fiji are also being used for renewable energy generation. Renewable energy technologies include biomass gasification and ethanol, particularly small-scale biofuels systems that are now affordable and more efficient.¹³⁶

The implementation of food security and nutrition projects in Fiji will result in a number of co-benefits. These include:

- Diversification of the food system, which can reduce risks from climate change and could generate significant health co-benefits from reduced dependence on imported processed food.¹³⁷
- Many livestock-related options, which can enhance the adaptive capacity of rural communities, in particular, of smallholders. Significant synergies exist between adaptation and mitigation, for example, through sustainable land management approaches.¹³⁸
- Changes to land-use and agricultural management, which can also affect biodiversity, both positively and negatively depending on farming practice. For example, agroforestry could favour biodiversity, while intensified monoculture farming may lead to a loss of biodiversity.¹³⁹
- Last, empowering women, which can bring synergies and co-benefits to household food security and sustainable land management.¹⁴⁰

136 Government of Fiji (2020), Fiji 2020 Agriculture Sector Policy Agenda.

137 IPCC (2019), *Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems*.

138 Ibid.

139 Smith, P, D Martino, Z Cai, D Gwary, H Janzen, P Kumar, B McCarl, S Ogle, F O'Mara, C Rice, B Scholes, O Sirotenko (2007), 'Agriculture', in B Metz, OR Davidson, PR Bosch, R Dave, LA Meyer (eds), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

140 IPCC (2019), *Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems*.

5.8.2 Access to climate finance

According to the Snapshot Report, based on the limited but available cost estimates, the agricultural sector has sufficient allocated support; however, only 44 per cent of the total allocated resources, or F\$32.6 million, was actually spent between 2016 and 2019.

Climate finance has been successfully utilised to implement a number of projects in the agriculture sector in Fiji. This includes the following projects:

- The USAID Climate Change and Food Security Project in Fiji, which focuses on adaptation measures that improve food security, particularly through good agricultural practices.¹⁴¹
- The Pro-Resilient Fiji – Strengthening climate resilience of communities for food and nutrition security project (funded by the European Development Fund and implemented by the FAO). The objective of the project is to structurally and sustainably reduce food and nutrition insecurity derived from the negative impact of climate change-induced disasters, by tackling the root and underlying causes of vulnerability.¹⁴²
- The Fiji Agricultural Partnerships Project, which focuses on engaging small-scale producers in sustainable farming partnerships in remote areas, particularly the highlands (funded by IFAD).
- Agriculture-based emission-reduction options to support NDCs in Vietnam and Fiji, which are identifying mitigation options and key capacity development needs in the agriculture sector (funded by the Government of Australia).

Table 5.24 provides an overview of the status of climate finance projects in agriculture sector.

141 Pacific Climate Change Portal, Climate Change Adaptation through Food Security and Sustainable Agriculture, Fiji, available at: <https://www.pacificclimatechange.net/project/climate-change-adaptation-through-sustainable-agriculture-fiji>.

142 European Commission, International Partnerships, 'Projects', available at: https://ec.europa.eu/europeaid/projects/pro-resilient-fiji-strengthening-climate-resilience-communities-food-and-nutrition-security_en

Table 5.24 Status of climate finance projects in the agriculture sector¹⁴³

Financing priorities	Climate-resilient crops, scale up climate resilient practices, implement community extension models.
Financing status	Limited progress: Further assistance is needed to achieve the actions prioritised in the Fiji 2020 Agriculture Sector Policy Agenda and the NAP.

Further assistance is required to strengthen outcomes in the agricultural sector. This could include the actions that were prioritised in the Fiji 2020 Agriculture Sector Policy Agenda and the NAP. These are listed in Table 5.25.

In addition, Table 5.27 details the key sources of financing for the agriculture sector in Fiji.

5.8.3 Potential data utilisation and application

The Ministry of Agriculture and the Ministry of Fisheries and Forest presently uses SRS data for their decision-making. The Ministry of Fisheries and Forest is well equipped with digital information on land allotments, land use and land covers. With EO data, improvements in agricultural sector diagnostics, programme monitoring and service delivery have been achieved in Fiji.

EO services are able to provide data and projections of crop biophysical, soil and climate characteristics, and the occurrence, duration and intensity of natural disasters, such as heat stress, droughts and floods, which strongly influence agricultural production.¹⁴⁴ Irrigation potential can also be determined, including land suitability, identifying constraints for irrigation development and quantifying water availability.¹²⁰ The efficiency of irrigation can also be assessed, and EO data on evapotranspiration and soil moisture can be used to determine which crops/areas are most in need of irrigation.¹⁴⁵

143 Author's own analysis.

144 European Space Agency, EO4SD Agriculture and Rural Development Cluster (2019), Final Report on Earth Observation for Sustainable Development in Agriculture and Rural Development, available at: <https://www.eo4idi.eu/>

145 World Bank and OECD (2019), World Bank national accounts data, and OECD National Accounts data files, World Bank.

EO data can support integrated ecosystem management, by determining the status of agroecosystems, such as impacts on the flow of ecosystem services to and from agroecosystems. EO data are also able to assess impacts of agriculture of particularly vulnerable ecosystems (such as wetlands), and patterns of deforestation and ecosystem loss and degradation.¹²⁰ For areas identified as having a higher susceptibility of land degradation and soil erosion risk, resources can be allocated to support vulnerable farmers.

SRS data also allow comparisons over time, and can provide effective, near real-time and large-scale agricultural monitoring systems. These data can help to assess the impact of project interventions, assisting the final programme or project evaluation, and also predict expected crop yields.¹²⁰ Lastly, EO data can map rural infrastructure assets and physical supply chain infrastructures, such as the road network, storage facilities and markets. These data can be used to support planning and design of rural infrastructure investments and to estimate future land-use demand.

5.9 Water supply and sanitation

5.9.1 Profile

The Fiji government recognises the importance of water and sewerage facilities in achieving socioeconomic development in Fiji. Over the past decade, GoF has significantly improved the supply of clean water and sanitation – approximately 71 per cent of Fiji's population now has access to improved sanitation, and 98 per cent of the urban population has access to clean water supplies.¹⁴⁶

While urban supply is now widespread, less than half of the rural population does not have access to piped water services.¹⁴⁷ Water quality remains an issue, and there is a lack of treatment of drinking water in communities, which can result in public health consequences.

There is limited coverage of sewerage services in both urban and rural areas, with the majority of the population depending on on-site sanitation facilities. While infrastructure management has improved in recent years, there remains limited

146 Government of Fiji (2017), National Development Plan 2017–2036.

147 Government of Fiji (2018), Third National Communication.

Table 5.25 Priority adaptation actions¹⁴⁸

Action	NAP 2018	Agriculture Sector Policy Agenda
Undertake regular climate change assessments, GIS mapping and crop modelling to improve understanding of environmental and climate risks (including for sloping and fragile lands) to agriculture production, distribution and processing, and use these assessments and models as part of national planning for food and nutrition security.	✓	
Improve biosecurity efforts (including border controls, early warning systems, on-site visits and breeding programmes) to enhance protection and action against invasive species, pests and diseases that can affect plant and livestock production, and establish good biosecurity facilities/ nurseries that follow sustainable agricultural practices.	✓	✓
Strengthen Fiji's disaster preparedness efforts in the agriculture sector, by encouraging agronomy practices, climate-based crop planning, and the protection, breeding and cultivation of traditional and improved seed varieties (including both plant genetics and open pollinated), cultivars and livestock breeds; advance research and nurseries; and enhance the resilience of crop and livestock breeding infrastructure and supply systems, as well as seed and food storage facilities.	✓	
Strengthen research collaborations with farmers (including disadvantaged groups), communities and national research institutions – supported (but not led) by regional and international institutions – to create a community of practice and to support knowledge networks which facilitate innovative and climate-adaptive farming practices.	✓	✓
Work with diverse and inclusive stakeholders to ensure farmers (including disadvantaged groups) have inclusive access to hazard maps and climate information services, via a range of information communication technology in common vernacular, to support inclusive participatory scenario planning at the local level.	✓	
Promote and integrate climate-smart agriculture (CSA) practices, into farming, trainings, extension services, policies and plans (responsive to the needs of disadvantaged groups and tailored to subsistence, semi-commercial and commercial farmers), and adopt nature-based and urban solutions where possible.	✓	
Improve water management systems by assessing and protecting existing water sources, improving and upscaling (low-cost) irrigation systems, improving and maintaining water drainage systems, applying and upscaling good agronomic practices for water conservation (e.g. mulching), and establishing watershed-based land-use planning committees and developing integrated watershed management plans.	✓	✓
Strengthen the resilience of farmers and farming families by encouraging the diversification of agricultural produce for subsistence consumption and market sales (especially in the sugarcane belt, coastal and interior areas, and marginal land); promote the (traditional) use of food preservation, processing and storage practices and seed banks; advance inclusive market information and dissemination systems; and improve financial literacy and inclusive access to financial services. Collaborate with the private sector to develop low-cost and locally produced feed supplements; and encourage agro-business schemes and investment into value addition and commercial agriculture ventures.	✓	✓

(Continued)

148 Ibid.

Table 5.25 Priority adaptation actions (Continued)

Action	NAP 2018	Agriculture Sector Policy Agenda
Assess farm community and sectoral attitudes to climate adaptation actions in agriculture, to develop appropriate and inclusive education and awareness programmes, extension services, farmer field schools, and institutionalised peer group systems that stimulate the take-up of agriculture (especially for the youth) aligned with adaptation actions.	✓	✓
Integrate climate change adaptation issues and actions into policy plans – such as commodity and industry plans (which are responsive to the needs of disadvantaged groups and tailored toward subsistence, semi-commercial and commercial farmers) – and into the development and strengthening of agriculture support services of research, extension and training.	✓	
Enhance support for irrigation schemes that support agricultural diversification and mitigate increased drought and flooding.	✓	✓
Maintain, adapt and construct sea wall and drainage infrastructure to reduce saltwater intrusion on agricultural land, due to sea-level rise and increased tidal surges.	✓	

funding for the sector to address challenges of insufficient cost recovery, or to finance operation, maintenance or capital investments.¹⁴⁹

Developing climate resilient water infrastructure is crucial, given the importance of water and wastewater systems to agriculture, industry, electricity generation, human health and maintenance of the natural environment in Fiji.¹⁵⁰

Water supply and wastewater systems are potentially at risk due to climate change hazards, including inland and coastal floods, droughts, extreme weather events and landslides. Water supply systems are vulnerable to drought-induced water shortages, while floods and extreme events could damage low-lying water infrastructure (including wastewater systems). This could result in declining water quality and increased water insecurity in at-risk communities.¹⁵¹

Another risk is due to the lack of diverse water supply sources for the urban population in Fiji. The water supply source in Fiji is predominantly surface water (70%), which supplies all major urban centres; this results in high sensitivity to changes in the hydrological system.¹⁵² Moreover, half of the

water supply originates from freshwater sources in coastal and low-lying areas, which makes the population more vulnerable to saltwater intrusion as the sea level rises.¹⁵³ Groundwater is a common source for small towns, and rural water supplies in low-lying islands, atolls and coastal areas are particularly exposed and vulnerable to climate hazards, including salinisation from sea-level rise and coastal flooding.

Water systems are also a source of GHG emissions in Fiji. Wastewater emissions were estimated at 58 GgCO₂Eq for 2011, and a high number of water supply systems, particularly in rural areas, rely on diesel generators for water pumping.¹⁵⁴

Without additional investments in resilience, climate change, coupled with increased urbanisation, could exacerbate water and wastewater challenges in Fiji. To address these issues, there is a need to upgrade, repair, relocate and build new water and sanitation infrastructure that is protected against flooding and other climatic events. At the same time, building codes, zoning and minimum standards for construction and management are crucial factors that should be considered in designing and developing these infrastructures.¹⁵⁵

149 Ibid.

150 Government of Fiji (2017), National Development Plan 2017–2036.

151 Government of Fiji (2018), National Adaptation Plan.

152 Government of Fiji (2018), Third National Communication.

153 Ibid.

154 Ibid.

155 Ibid.

Table 5.26 Adaptation actions for fisheries¹⁵⁶

Action	NAP 2018
Upgrade existing aquaculture facilities and develop pond aquaculture to boost brood and seed stock production.	✓
Promote sustainable fisheries management and the replenishment of fish stocks through management tools, such as the establishment and better management of inshore and deep water marine protected and locally managed areas, seasonal closures, size limits and quotas, gear restrictions, and a review of the offshore fish license cap and fishing aggregating devices.	✓
Intensify collaboration with development partners (land and marine) to strengthen community-based fisheries management, integrated sustainable resource management and development initiatives through ongoing fisheries programmes.	✓
Upgrade existing databases to capture data on the status of inshore/coastal and offshore marine resources (including regeneration and harvesting levels), for planning and informed decision-making and to improve accessibility to all fisheries stakeholders.	✓
Integrate climate change issues into National Fisheries Policy and the review of the Fisheries Act 1942 and associated regulations, decrees and bills.	✓
Support the restoration, enhancement and conservation of coastal ecosystems, such as mangroves, seagrasses and coral reefs, in collaboration with the Ministry of Fisheries and Forest, local communities and actors, community fishery reserves, and other partners, such as tourism associations.	✓
Promote sustainable non-extractive cultured fisheries (e.g. pearls, seaweed), to reduce pressure on capture fisheries.	✓
Extend early warning systems for fishing households, including remote communities, and train communities on disaster response and disaster risk reduction.	✓
Foster the care of coastal fish habitats, including by providing for landward migration of coastal fish habitats and allowing for the expansion of freshwater habitats, and, in particular, address the effects of land management on nearshore ocean health.	✓
Sustain the harvesting and production of coastal fish and invertebrates for local food security and livelihoods.	✓

Table 5.27 Key sources of climate financing for the agriculture sector¹⁵⁷

Financing instruments	Grants.
Financing sources	Key sources of climate finance could include GCF, GEF, AF, CIF, FAO, IFAD, UNDP, World Bank, ADB and bilateral donors (e.g. MFAT, Agence Française de Développement [AFD], USAID).

Given the high reliance on surface water sources, there is also a need to promote other water sources, such as rainwater harvesting and desalination. This will be achieved through

planning, including by enhancing existing plans to mainstream climate and disaster risks.

Strengthening asset management, including by undertaking ongoing maintenance and financing long-term operational sustainability, is also vital for developing sustainable water systems in the Pacific.

The implementation of water supply and sanitation projects in Fiji will result in a number of co-benefits. These include:

- Developing climate-resilient sanitation systems (including wastewater treatment), which could result in reduced pollution to receiving environments, improved water quality, and economic benefits to the fishing, agriculture and tourism sectors.
- Improved water quality, which could result in health benefits from reduced incidences of water-borne disease. This could also result in

¹⁵⁶ Ibid.

¹⁵⁷ Ibid.

additional socioeconomic benefits, including poverty reduction and productivity gains.

- Last, developing climate-resilient water supplies proactively could also save costs – as climate hazards could increase the cost of supplying water in the future, through water shortages, saltwater incursion and damages to infrastructure.

At present, no overarching water policy or water legislation exists in Fiji, but water objectives and goals are put forward in other key policies and plans, such as the National Development Plan and the NAP. There is also no existing sanitation policy, and sanitation planning and management are also addressed in the NDP and NAP.

5.9.2 Access to climate finance

According to the Snapshot Report, on average per year, from 2016 to 2019, more than F\$173.2 million was allocated to projects in the water and sanitation sector; however, roughly 50 per cent of that, or F\$86 million, was actually spent.

Therefore, while GoF has received significant climate change-related support in the water and sanitation sector in recent years, further support is required. The government has been successfully accessing climate finance from the following key projects:

- The Fiji Urban Water Supply and Wastewater Management Project (funded by the GCF, ADB and other financiers). This will improve access to safe water and sewerage services, by building infrastructure to increase water production by 20 per cent and wastewater treatment by 200 per cent in the greater Suva area, and by supporting government to develop and implement policy and regulatory reforms in water and sewerage.
- The Water and Nature Initiative (WANI) Project, implemented by IUCN, which helped establish the Nadi Basin Catchment Committee to provide appropriate stakeholder engagement in the development of a Flood Risk Management Plan.¹⁵⁸

158 IUCN, Water and Nature Initiative (WANI) Project, available at: <https://www.iucn.org/regions/oceania/our-work/nature-based-solutions/water-and-wetlands/completed-projects/water-and-nature-initiative-wani-project>

- The Pacific IWRM (Integrated Water Resource Management) Project, a regional project funded by the GEF, which tackled the risks and impacts of flooding in the Nadi basin catchment.¹⁵⁹
- Funded by the New Zealand government, the WASH (water, sanitation and hygiene) Koro project. This mobilises community-led water supply, sanitation and hygiene improvements in Fijian villages. It is a collaborative participatory project that aims to provide self-help tools to mobilise communities to recognise and address their own water supply, sanitation and health/hygiene needs.¹⁶⁰
- Bilateral support from the Australian government, JICA and KOICA on planning, financing, institutional strengthening and capacity building.

According to the Snapshot Report, the allocated expenditure to the water and sanitation sector exceeded identified needs. But of this allocation, actual expenditures stood at 53 per cent of the identified needs.

Table 5.28 provides an overview of the status of climate finance projects in the water supply and wastewater sector.

Table 5.28 Status of climate finance projects in the water supply and wastewater sector¹⁶¹

Financing priorities	Improving planning, institutional and regulatory frameworks; assessing climate risks; upgrading, repairing, relocating and building new water and sanitation infrastructure; undertaking stakeholder engagement; and strengthening monitoring and evaluation.
Financing status	Limited progress: Climate finance projects are aligned with national priorities, but expenditure needs to increase to meet identified needs.

159 Source: <http://www.pacificwater.org/pages.cfm/water-governance/integrated-water-resource-management/pacific-iwrm-programme/the-pacific-iwrm-project/>

160 NIWA (2017), 'On-Site Household Sanitation Guidelines for Fiji', available at: <https://niwa.co.nz/pacific-rim/research-projects/koro-sanitation-guidelines>

161 Author's own analysis.

Further assistance is required to achieve water supply and wastewater goals and targets, particularly for rural communities.

The provision of climate finance should be aligned to the policy objectives of the NDP and NAP. Potential future projects are listed in Table 5.29.

Table 5.29 Priority adaptation actions¹⁶²

Action	NAP 2018
Require national and subnational government to prepare and publish climate disaster management plans, detailing how water and sanitation resources will be managed and protected in the event environmental and climate hazards. The plans must assess the potential impact of climate change and disasters on water and sanitation resources at the local level, and are to be based on latest climate projections from the Fiji Met Service.	✓
Conduct a comprehensive assessment of all of Fiji's water and sanitation infrastructure (both small and large scale, government operated or community operated) and resources, in order to meet current and future needs in light of climate change projections. The assessment will identify instances where infrastructure needs to be upgraded, replaced or relocated. The assessment is also to provide recommendations for (rural) communities not currently connected to reticulated or government-operated systems.	✓
Upgrade, repair, relocate and build new water and sanitation infrastructure, which is appropriate for future needs of all community members and able to withstand predicted future climate risks. These new infrastructure developments are to be guided by the comprehensive assessment and must meet minimum standards.	✓
Develop, implement and enforce building codes, zoning and minimum standards for the construction and management of new water and sanitation infrastructure. Government agencies must be required, and empowered with the authority, to enforce safety and resilience standards.	✓
Build the capacity and responsibility of communities and empower them to manage risks to water and sanitation, by adopting risk management concepts by all rural communities, prioritising those which are especially vulnerable to climate change risks or water insecurity. This will build on existing partnerships between communities, case studies, the private sector and government agencies.	✓
Support the use of alternative sustainable water sources (including but not limited to rainwater harvesting and desalination).	✓
Promote the development and implementation of integrated water resource management plans (IWRM) in river basin catchment areas, based on existing best international practices and building upon national and traditional experiences, including efforts to protect freshwater aquifers from saltwater intrusion, as well as natural protected areas.	✓
Support community involvement in water resource management, by raising awareness and strengthening the capacity of community-based organisations (CBOs), NGOs and government departments to disseminate information on sustainable and climate-resilient water management to communities.	✓
Strengthen the abilities of planners to successfully incorporate climate and disaster risks into water and sanitation plans, by improving accessibility of hazard maps and downscaled climate projections, co-ordination between stakeholders, and access to training.	✓
Improve the management of monitoring and evaluation data, by adoption of an integrated approach between agencies and development of an integrated database on national water resources.	✓

162 Ibid.

Table 5.30 Key sources of climate financing in the water supply and wastewater sector¹⁶³

Financing instruments	Grants, concessional loans, equity and guarantees.
Financing sources	Key sources of climate finance could include GCF, GEF, the Adaptation Fund, ADB, WB, UN agencies (e.g. UNDP), and bilateral donors (e.g. DFAT, KOICA).

In addition, Table 5.30 details the key sources of financing for the water supply and wastewater sector in Fiji.

5.9.3 Potential data utilisation and application

Data utilisation for water and wastewater projects could be strengthened by SRS data. Satellite-based sensors are now capable of making direct and indirect measurements of nearly all components of the hydrological cycle.¹⁶⁴

A SRS-based water monitoring system is in place in Suva, with support from the University of the South Pacific (USP). It provides real-time monitoring of water quality and the water management system, and results in improving the overall health of the environment.

Furthermore, SRS data can improve hydrometeorological monitoring and prediction, including to monitor the status of water reservoirs/basins, lakes and large rivers, and by predicting impacts of droughts on water supplies.¹⁶⁵ SRS data could also indirectly be used to understand groundwater recharge rates, by looking at evapotranspiration in riparian and wetland ecosystems and environments. Water quality changes, which are a risk due to climate change, can

also be measured based on key parameters, such as vegetation indexes, land-use change observations and algal bloom frequency, which can complement ground measurements.¹⁶⁶ SRS data can also be used to better predict and understand flood risk. The use of satellite data in forecasting and managing flood risk is covered in more detail in the resilient infrastructure and disaster risk reduction sections of this report.

SRS data could be used for planning and monitoring the effectiveness of wastewater systems, which could include monitoring the receiving environments. For example, SRS can be used for monitoring wastewater discharges into coastal waters, which can support decision-makers by determining which areas/communities require investment in developing and improving wastewater systems.

Additional data is also required to improve water supply and wastewater outcomes. Future climate finance projects could focus on strengthening information management and data collection, including by mapping of water resources and identifying catchments and infrastructure at risk; improving information sharing between local water committees, the government and private sector providers; and by strengthening understanding of community needs.

5.10 Health

5.10.1 Profile

Public health outcomes in Fiji are at particularly high risk due to climate change. The marginalised parts of society, which lack access to health facilities, have a high vulnerability to climate hazards and associated health impacts. The COVID-19 pandemic has also exposed current weaknesses and gaps in the health system, which makes the task of strengthening the health system even more urgent.

The Ministry of Health and Medical Services (MoHMS) Strategic Plan 2020–2025 states that the climate crisis is presently affecting health, and that it will continue to affect the social and environmental determinants of health: clean air, safe drinking water, sufficient food and secure shelter.¹⁶⁷ Furthermore, the Fiji Climate Change and Health Strategic Action

¹⁶³ Ibid.

¹⁶⁴ Sheffield, J, EF Wood, M Pan, H Beck, G Coccia, A Serrat-Capdevila and K Verbist (no date), 'Satellite remote sensing for water resources management: Potential for supporting sustainable development in data-poor regions', *Water Resources Research*, 54, available at: <https://www.frontiersin.org/articles/10.3389/fmars.2017.00329/full>

¹⁶⁵ Trinh, R, B Holt, B Pan, C Rains and M Gierach (2014), 'Satellite Remote Sensing Detection of Wastewater Plumes in Southern California', American Geophysical Union, Fall Meeting, available at: <https://ui.adsabs.harvard.edu/abs/2014AGUFMOS23C1224T/abstract>

¹⁶⁶ World Bank and OECD (2019), World Bank national accounts data, and OECD National Accounts data files, World Bank.

¹⁶⁷ Government of Fiji (2020), Ministry of Health and Medical Services Strategic Plan 2020–2025.

Table 5.31 Highest priority health risks

Categories	Health risks
Direct effects	<ul style="list-style-type: none"> • Health impacts of extreme weather events
Indirect effects	<ul style="list-style-type: none"> • Water security & safety (including water-borne diseases) • Food security & safety (including malnutrition & food-borne diseases) • Vector-borne diseases • Zoonoses • Disorders of the eyes, ears, skin and other body systems
Diffuse effects	<ul style="list-style-type: none"> • Disorders of mental/psychosocial health • Non-communicable diseases (NCDs) • Health systems problems

Plan 2016–2020 provides a framework supporting the health sector, and includes a list of priorities for achieving climate adaptation outcomes in the health sector.

Climate change will result in direct physical health impacts (e.g. deaths and injuries), from increasingly severe and frequent cyclones, increases in extreme daily temperatures, and inland and coastal flooding. This is demonstrated by the impacts of Cyclone Winston, which affected more than 350,000 people in Fiji (40% of the population).¹⁶⁸ Preparation for climate-related emergencies locally and regionally has been enhanced, including through the development of Fiji's Emergency Medical Assistance Team (FEMAT), which is the first team in the Pacific islands to be certified by the World Health Organization (WHO) for international deployment.¹⁶⁹

The distribution and prevalence of diseases will also be affected, including water-borne and vector-borne diseases (VBDs), and nutritional deficiencies associated with food insecurity.¹⁷⁰ Of most concern are the indirect and diffuse effects of climate-sensitive health risks, in particular the four main climate-sensitive diseases of dengue fever, typhoid fever, leptospirosis and diarrhoeal disease. Fiji tends to experience outbreaks of these diseases when floods or cyclones have occurred.¹⁷¹

Climate change will also result in impacts on mental health and the delivery of health services. The hospitals and health clinics of Fiji are also likely at risk due to climate change hazards, such as flooding

and coastal hazards. Cyclone Winston, for instance, damaged health facilities and disrupted healthcare services.¹⁷² Health issues exacerbated by climate change may also have subsequent indirect negative impacts on key economic sectors, such as the tourism sector.

The highest priority climate-sensitive health risks for Fiji are shown in Table 5.31.¹⁷³

Achieving improved health outcomes for rural communities, women, and low-income and other disadvantaged groups should be a particular priority, as they will disproportionately experience climate change impacts on health.¹⁷⁴

The co-benefits from increasing resilience in the health sector include:

- Socioeconomic benefits from building climate-resilient health systems and safeguarding public health. These include poverty reduction, improved economic productivity, and protection of women and children (children under 5 and pregnant women are at heightened risk of vector-borne diseases).¹⁷⁵
- Improving health, which is a no-regret option as it provides benefits regardless of climate change. This is emphasised in the CVA,

168 Ibid.

169 Ibid.

170 Government of Fiji (2017), Climate Vulnerability Assessment.

171 Government of Fiji (2018), National Adaptation Plan.

172 World Health Organization (2016), 'Cyclone Winston', available at: <https://www.who.int/westernpacific/emergencies/cyclone-winston-2016>

173 World Health Organization (2015), *Human health and climate change in Pacific island countries*.

174 Government of Fiji (2018), National Adaptation Plan.

175 Bardosh, KL, SJ Ryan, K Ebi et al. (2017), 'Addressing vulnerability, building resilience: community-based adaptation to vector-borne diseases in the context of global change', *Infect Dis Poverty* 6, 166, available at: <https://doi.org/10.1186/s40249-017-0375-2>

which stresses that 'human health is a key component of adaptation activities across all sectors' and that a 'healthy population is a resilient population'. In relation to this, there are co-benefits from other projects, including in the transport sector (improved air quality, and exercise benefits resulting from modal shifts to walking and cycling), electricity generation (improved air quality), and by reducing indoor air pollution from transition to RE sources.¹⁷⁶

- Adaptation projects also have health co-benefits, including flood protection, disaster risk reduction and climate resilient food systems.¹⁷⁷

Implementing adaptation action in the health sector is considered a priority in national plans and policies. Health is considered a priority sector within the NDP, which states the aim to improve medical services to international standards, with a major focus on tertiary healthcare and overall medical service delivery over the next 20 years.¹⁷⁸ Strengthening population-wide resilience to the climate crisis is also a strategic priority in the Ministry of Health and Medical Services (MoHMS) Strategic Plan 2020–2025.¹⁷⁹

5.10.2 Access to climate finance

There have been limited projects in the health sector in Fiji. Past projects have included:

- Bilateral support from the German government on climate change and Zika infections in Fiji, and the European Commission on addressing the protection needs of people displaced in the context of disasters and adverse effects of climate change in the Pacific region.
- 'Piloting Climate Change Adaptation to Protect Human Health', which involves increasing the adaptive capacity of national health system institutions, including field practitioners, to respond to climate change-sensitive health risks (funded by the GEF).

Limited data on climate finance flows into health sector projects are provided in the Snapshot Report. From the preliminary analysis undertaken, approximately F\$11,308,347 was allocated annually on health-related projects over 2016–2019. Further research is required to determine the expenditure of climate-related health projects and the needs within this sector.

Table 5.32 provides an overview of the status of climate finance projects in the health sector.

The Climate Change and Health Strategic Action Plan (CCHSAP) 2016–2020 and the NAP include priority interventions to address climate change risks. These are shown in Table 5.33.

In addition, Table 5.34 details the key sources of financing for the health sector in Fiji.

5.10.3 Potential data utilisation and application

Since 1992, Fiji uses satellite and remote sensing applications in various fields.¹⁸⁰ The Ministry for Health and Medical Services in Fiji adopted SRS-based early detection of vector-borne diseases (for example, the Zika virus). The Biosecurity Authority of Fiji (BAF) also implemented SRS-based information technologies in an effort to predict potential occurrence of diseases, which could pose harm to animals and humans (zoonotic diseases).¹⁸¹

Table 5.32 Status of climate finance projects in the health sector¹⁸²

Financing priorities	Identifying and planning for climate change risks in the health sector, control of water-borne and vector-borne diseases, and developing climate-resilient health buildings and infrastructure.
Financing status (adaptation)	Limited data progress: Additional assistance and research is needed.

176 Government of Fiji (2017), Climate Vulnerability Assessment.

177 Campbell-Lendrum, D, L Manga, M Bagayoko and J Sommerfeld (2015), 'Climate change and vector-borne diseases: what are the implications for public health research and policy?', *Philos Trans R Soc Lond B Biol Sci*, 5, 370(1665), 20130552.

178 Government of Fiji (2017), National Development Plan 2017–2036.

179 Government of Fiji (2020), Ministry of Health and Medical Services Strategic Plan 2020–2025

180 *Fiji Sun* (2017), 'Technology: GIS and Remote Sensing Can Aid Pacific Islands', available at: <https://fijisun.com.fj/2017/11/28/technology-gis-and-remote-sensing-can-aid-pacific-islands/>

181 FAO Regional Office for Asia and the Pacific (2018), 'Using technology to track zoonotic diseases in Fiji', available at: <http://www.fao.org/asiapacific/news/detail-events/en/c/1106470/>

182 *Author's own analysis.*

Table 5.33 Adaptation actions to achieve resilient health sector outcomes¹⁸³

Action	NAP 2018	CCHSAP
Establish and strengthen a formal link to the National Climate Change Coordinating Committee, to support the incorporation of the health agenda into the national, regional and global platform; and ensure effective co-ordination of risk management and resilience for communicable diseases, health emergencies, climate change and natural disasters, and climate-sensitive environmental health determinants.	✓	✓
Improve case detection and a co-ordinated response to reduce communicable disease morbidity and mortality, through the effective and efficient use of available resources and information.	✓	✓
Retrofit health facilities, and associated infrastructure, to prevent vulnerability to climate change impacts.	✓	✓
Repair and reconstruct through the 'build back better' concept of health infrastructure affected by disasters, particularly Cyclone Winston and the 2017 landslides in Qamea and St Giles Hospital.	✓	
Strengthen and empower the Climate Change and Health Unit, by increasing resources and personnel with clear mandates to implement the Climate Change and Health Strategic Action Plan 2016–2020 and other relevant national, regional and international plans, policies, agreements and conventions.	✓	✓
Identify and prioritise adaptation needs and associated health-risk exposures of communities and populations most vulnerable to climate variability and change, through the profiling or use of existing data; and by developing proposals, recommendations and plans for adaptation strategies to address identified gaps.	✓	✓
Enhance the resilience of the national health system by developing the capacity of health workers, including environmental health officers, laboratory technicians, doctors, nurses, pharmacists and other practitioners on health and climate change adaptation and disaster risk reduction; and by promoting training capacities in the field of disaster medicine.	✓	✓
Improve diagnostic and treatment capacities to manage climate change and health risks, to ensure that healthcare infrastructure at all levels (especially in disaster-prone areas) is capable to respond effectively to climate-sensitive diseases (dengue, diarrhoea, typhoid, leptospirosis) and other climate-related conditions, such as injuries, food-borne illness and fish poisoning (ciguatera).	✓	✓
Develop policies that reflect health protection from climate risks and disaster risks, particularly in relevant health legislations, policies and other relevant climate regulations and protocols, to ensure that short- and long-term action plans are developed for improved health infrastructure, staffing and capacity to cope with the climate and disaster risks, such as vector-borne and water/food/air-borne diseases.	✓	✓
Prepare, translate, print and distribute information brochures, combined with TV and radio shows, about the impacts of climate change and appropriate responses for health and protection measures during extreme weather events, along with other measures to prevent occurrence of climate-sensitive diseases, with specific attention on vulnerable population groups.	✓	✓

183 Ibid.

Table 5.34 Key sources of climate financing for the health sector¹⁸⁴

Financing instruments	GoF should primarily access grant financing, but for projects that have indirect health outcomes, such as strengthening flood management, concessional loan financing could be accessed on a case-by-case basis.
Financing sources	Financing sources for direct health-related projects will include the GCF, GEF (the Least Developed Countries Fund [LCDF]) and UN agencies (WHO, UNDP). For indirect health-related projects, the sources of financing will be varied, as outlined in sectoral assessments in this document.

Vulnerability assessments should first be undertaken to understand current disease control measures, problems related to resistance developed by mosquitoes and socioeconomic

factors, such as migration of population. Informed by the vulnerability assessment, satellite monitoring can be used to monitor in real time the risks of disease transmission, based on climate and environmental factors, including increases in precipitation or in temperature.¹⁸⁵ Therefore, this can be used as an early warning system to reduce the risk VBDs.¹⁸⁶ Once control measures are in place and projects are under implementation, satellite data can be used to assess the efficacy of the intervention.

SRS data can also be used to understand the exposure of communities, and associated health infrastructure, to climate change hazards. SRS data could be used to monitor urban and peri-urban growth and, in concert with hazard mapping (e.g. flood hazard and coastal hazard maps), be used to determine the climate change risk for particular communities and to inform suitable locations for the construction of new clinics and hospitals. Given that health outcomes are also driven by reducing climate change risk in the other key sectors, including the agriculture, infrastructure and water sectors, the use of satellite monitoring in these sectors could also lead to improved health outcomes.

184 Ibid.

185 Ford, T, R Colwell, J Rose, S Morse, D Rogers and T Yates (2009), 'Using Satellite Images of Environmental Changes to Predict Infectious Disease Outbreaks', *Emerging Infectious Diseases* 15(9), 1341–1346, available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2819876/>

186 Rogers, D, S Randolph, R Snow and S Hay (2011), 'Satellite imagery in the study and forecast of malaria', *Nature*, 415(6872), 710–715, available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3160466/>

6. Recommendations for Attracting Climate Finance

While Fiji has developed key national planning frameworks (as outlined in Chapter 2), and has successfully attracted climate finance to implement sectoral priorities (as outlined in Chapter 4 and Chapter 5), further action is needed to overcome implementation barriers.

The Fiji government recognises that increased mobilisation of climate finance is needed for achieving its adaptation and mitigation targets. The mobilisation and disbursement of climate finance remains a key challenge in Fiji, due to a lack of scalable, tested and bankable projects capable of attracting private sector investment, and a lack of trained technical staff capable of developing and delivering a strategic pipeline of projects with appropriate documentation (particularly for multilateral financing sources).

Attracting additional flows of climate finance, and implementing the adaptation and mitigation actions outlined in the NAP, NDC Implementation Roadmap and LEDS, will require improved governance and co-ordination, better utilisation of data, strengthened technical capacity, and increased private sector engagement. This chapter outlines recommendations to address these challenges and attract climate finance.

Moreover, the results of this assessment, including the status of plans and strategies, are summarised in Table 6.3 in this chapter.

6.1 Governance mechanisms

As a cross cutting challenge, addressing climate change requires strong co-ordination and communication across sectors. Fiji has taken a forward-thinking approach, with the establishment of strong institutional, policy and regulatory frameworks. The GoF has established the Climate Change and International Cooperation Division, Ministry of Economy, and the National Climate Change Coordination Committee. While Fiji has made significant progress, there remains a lack of lack of co-ordination between stakeholders (central and local government agencies, and development partners), and insufficient co-ordination between the public sector and private sector.

To enhance governance of climate change, the following recommendations are suggested:

- The National Climate Change Coordination Committee (NCCCC) was established under the Climate Change Bill (2019), with the roles and responsibilities of the NCCCC are outlined in section 6.1.2. The NCCCC should have a clearly defined focus and technical support to ensure effective decision-making. A technical working group could be established under the NCCCC, which could focus on securing climate finance to implement priority actions. Moreover, a number of Pacific island countries and countries globally have experience with inter-ministerial co-ordination, and the GoF should draw on these lessons.
- The GCF no-objection procedure should be established. The Global Green Growth Institute is presently supporting the GoF (funded by GCF Readiness and Preparatory Support) with strengthening institutional capacity and co-ordination mechanisms to govern and co-ordinate climate action. This involves the establishment of a platform that will also play a role in the GCF no-objection procedure. It is important that this mechanism is aligned to the NCCCC, and could take the form of a technical working group under the NCCCC.
- Additional co-ordination mechanisms should be developed on the ground among ministries, divisions, the private sector, development partners, communities and civil society organisations (as recommended by the Post Disaster Needs Assessment conducted after Cyclone Winston). In order to achieve this recommendation, climate change focal points and units could be established in the relevant ministries, local government agencies, and at the community level to strengthen co-operation and co-ordination and catalyse climate action.
- A Private Sector Advisory Board (as planned by CCID) should be established to help integration and alignment between the public

and private sectors (including private–public partnerships and the design of policies, regulations and standards), and in recognition of the private sector as a catalyst and financier of climate actions.

Moreover, key stakeholders involved in the governance of climate change are described below, and are also listed in Table 6.3.

6.1.1 Climate Change and International Cooperation Division

The Climate Change and International Cooperation Division (CCICD) plays a central co-ordinating role in support of the NCCP and also in co-ordinating and implementing the NDC, NAP, LEDS and the NDC Implementation Roadmap. The key roles of CCICD are:

- **Co-ordination of climate finance:** CCICD acts as a conduit between donors, climate funds and sector recipients of climate finance to help support an integrated approach to proposal design, funding alignment with priorities and efficient implementation arrangements. Although CCICD may not co-ordinate specific funds, it should be involved with all climate finance flows to support co-ordination, reduce duplication and enhance climate finance tracking. CCICD works closely with the national budget process and relevant offices within the Ministry of Economy to improve budget coding and tracking systems. CCICD also leads on the reporting and monitoring of domestic climate finance sources, such as the Environment and Climate Adaptation Levy, private sector sources and insurance initiatives. CCICD oversees Fiji's engagement with the Green Climate Fund, and will engage internationally to enhance Fiji's access to sustainable climate finance flows and assist to channel those flows to the appropriate entities implementing climate change actions within Fiji.¹⁸⁷
- **Implementation co-ordination, support and reporting:** CCICD is responsible for co-ordinating implementation and reporting associated with Fiji's LEDS, NDP, NDC and NAP. CCICD will help co-ordinate

sector actions, liaising closely with all government ministries and agencies to assist implementation, improve data sharing, and enhance inter- and intra-ministerial co-operation.¹⁸⁸

- **International reporting and engagement:** CCICD is responsible for reporting on behalf of the Republic of Fiji to the UNFCCC, as well as ensuring transparency, integrity and consistency in national reporting on the Sustainable Development Goals (SDGs). CCICD is also responsible for MRV for the NDC and other processes, and will to recruit specific monitoring and evaluation expertise as required to support this remit.¹⁸⁹
- **Knowledge management and advisory support:** CCICD supports climate change knowledge management, by developing communications strategies, developing and maintaining data repositories, and supporting functions and knowledge products designed to raise awareness of key climate change issues in government, the private sector and civil society. CCICD works to provide support to government ministries in national efforts to mainstream climate change into development planning, sectoral planning and strategies, decision-making, and policy.¹⁹⁰
- **National advocacy and awareness:** CCICD works with government ministries to support national climate advocacy and awareness-raising campaigns, to support public awareness and increase the visibility of key issues in adaptation and mitigation.¹⁹¹

6.1.2 The National Climate Change Coordination Committee

The NCCCC is comprises the permanent secretaries and nominated representatives from government ministries, departments and agencies. The NCCCC functions on behalf of the Fijian government, and includes the following roles and responsibilities:

- ensure ministerial and department activities are aligned with relevant cross-cutting policies and frameworks;

187 Government of Fiji (2018), National Climate Change Policy 2018–2030; Government of Fiji (2018), Low Emissions Development Strategy.

188 Ibid.

189 Ibid.

190 Ibid.

191 Ibid.

- ensure the creation, implementation, and monitoring and evaluation of these cross-cutting policies;
- ensure the creation, implementation, and monitoring and evaluation of relevant sector plans;
- assess its own progress on integrating climate change issues into ministerial and department activities and report on that progress; and
- provide advice and assist with resolving strategic-level issues and risks.

To ensure the effective operationalisation of the NCCCC, lessons should be transferred from other inter-ministerial committees in Fiji and other PICs. Key recommendations include having consistent representation from ministries and departments (for example, the same official consistently attending committee meetings), establishing technical committees with defined mandates (such as to appraise and approve climate finance proposals), developing focused roles and responsibilities, and ensuring the committee and associated processes are transparent and inclusive.

6.2 Capacity development

The NCCP 2018 emphasises the importance of capacity building, technology transfer and knowledge sharing as central enablers for Fiji's adaptation and mitigation needs and commitments. It also emphasises that increasing government interactions with academia and global research networks will increase access to cutting-edge innovation, technology transfer and capacity building.¹⁹²

Fiji continues to be constrained by capacity and technical barriers, and strengthening capacity is a national priority for the country. Key capacity-related challenges are insufficient capacity and resources to develop competitive proposals for climate change funds and to implement and monitor climate actions; as well as insufficient technical expertise related to climate change, including best practices for designing, implementing and monitoring projects and programmes. The following actions are recommended for building technical and human capacity:¹⁹³

- **Assessment of requirements:** It is recommended in the LEDS that an assessment of the skills needed is undertaken. Although there is awareness of deficiencies in the skills required for a low-carbon climate-resilient development path for Fiji, a more comprehensive assessment is needed to clearly identify gaps, quantify needs, ascertain priority areas that need addressing now, and to develop a broad timetable for skills improvements consistent with the NAP, LEDS, NDC Implementation Roadmap and other priorities. This should focus on CCID, NCCC, and national-level and subnational-level agencies.
- **Long-term support:** Capacity development should be provided through long-term in-country initiatives, rather than short-term, ad hoc and piecemeal support. The CCFAH and Global Green Growth Institute models of embedded support should be expanded, including to line ministries.
- **Support to CCICD and NCCC:** The key stakeholders to champion climate action, CCICD and NCCC, should be the focus of capacity-building efforts. The staff of all sections of the Ministry of Economy are the core stakeholders and will need capacity building to effectively carry out this function of implementing the LEDS, NDC Implementation Roadmap, NAP and the national budgeting process. This may also require training on technical aspects of subsector activities and, also, training in facilitation. CCICD and NCCC should engage and draw on technical expertise from different line ministries, as needed.
- **Capacity building to sectoral ministries:** Training should be designed and tailored to sectoral requirements – e.g. biomass energy development and energy management. Sectoral staff involved in climate change projects should be provided training, which is linked to a formal professional development strategy.
- **Decentralised capacity building:** The roles of local government entities, including city and town councils, district offices and provincial councils, are vital for delivering climate change objectives at the community and national levels. Local government entities will require capacity building, training and resources

192 Government of Fiji (2018), National Climate Change Policy 2018–2030.

193 Based on recommendations from: Government of Fiji (2018), Low Emissions Development Strategy; Government of Fiji (2020), Third National Communication.

for implementing climate change actions. Capacity building and awareness/advocacy initiatives should be tailored and relevant to local and community contexts. Effective mechanisms are needed to ensure that knowledge is decentralised and distributed to key users and to ensure that local and subnational actors can collect, and input, the data required to support localised actions.¹⁹⁴

- **Support to direct access entities:** Build capacity of climate change fund direct access entities – including the Fiji Development Bank (which is accredited to the GCF) and the Ministry of Economy (which will apply for accreditation).
- **Incentivising capacity improvements:** To overcome systemic capacity challenges, GoF should explore options to provide additional incentives for attracting strong expertise and retaining human capacity.
- **Training:** Partnerships between the public, private and academic sectors will be key to building awareness across stakeholder groups and enabling co-ordinated action across sectoral siloes. Moreover, CCICD and NCCC could also provide national training sessions to build knowledge, raise awareness, and support line ministries and other key stakeholders with proposal development.
- **Knowledge sharing:** Climate change information should be easily accessible to stakeholders (for example, by utilising online resources). CCICD could support climate change knowledge management, through the development and maintenance of communications strategies, data repositories and functions, and products designed to raise awareness within government, the private sector and the general public of key climate change issues.

At present, a number of development partners are providing support to Fiji on overcoming capacity barriers and technical challenges related to achieving action to address climate change. This includes support from the GCF Readiness and Preparatory Support programme on strengthening

co-ordination, establishing the GCF no-objection procedure and building the readiness of the Ministry of Economy to apply for GCF accreditation.

6.3 Information and data utilisation

The applicability and utilisation of SRS or EO data for climate change projects in each sector is outlined in Chapters 4 and 5.

Despite advances in the availability and quality of space applications and geospatial information, several gaps and challenges in their effective use remain. At present, the utilisation of EO data for project design and implementation has been undertaken in an ad hoc manner, with higher utilisation in the energy, forests and land use, DRR, agriculture and water sectors (as shown in Table 6.3). The need to develop the capacity to collect, manage and generate climate knowledge is relevant to all adaptation and mitigation priorities.

Several regional activities have been undertaken in Fiji since 1992 to support SRS application, including the South Pacific Community (SPC). However, at the government level, there has been limited awareness, capacity and capabilities for using EO data, which restricts the potential for upscaling of EO data applications in Fiji. Several ongoing or pilot projects have been demonstrated in Fiji, which are summarised in Chapter 4.

Key challenges include financial barriers and a lack of co-ordination and information sharing between institutions. This includes the high cost of data collection and processing, and difficulties centralising, securing and sharing different types of data across institutions.¹⁹⁵

A key challenge is a weakness in policies, procedures and guidelines for acquiring, sharing and utilising EO services. Existing procedures are often not harmonised between agencies that need to co-operate, such as national and subnational governments during disasters. Recently developed strategies and plans, including the NAP and LEDS, contain minimal references on the potential use of EO data, either for designing interventions or completing monitoring and evaluation of implementation progress. This could be because

194 Government of Fiji (2018), Low Emissions Development Strategy.

195 UN ESCAP (2019), 'Satellite communications in the Pacific Island Countries. Asia-Pacific information superhighway', Working Paper.

these plans and strategies were led by CCICD, which at present does not have strong capacity or capabilities in EO data application.

While a number of pilot activities have been undertaken and there are examples of successful EO data utilisation, the benefits and potential of these activities need to be demonstrated to other sectors. There is a greater need for effective, user-friendly and tailored tools to bridge the gap between departments and officials, with a strong understanding of EO data – such as Fiji Meteorological Service (FMS) and the NDMO – and other endusers in CCICD and sectoral agencies. Expanding the use of EO data in climate finance projects will be a strong lever for expanding EO data, strengthening climate action, and building support for incorporating the use of EO in sectional and national plans and strategies.

Undertaking capacity building and training on EO data applications, processing and utilisation are also key priorities. At present, Fiji does not have a critical mass of people who can utilise, analyse and interpret SRS data and geospatial information at the country level. Processing geospatial information into a form that can be effectively used for accurate and evidence-based decision-making can be very time consuming and errors can easily be made.¹⁹⁶

Previously, trainings have been undertaken in Fiji on the use of SRS and geospatial information. For example, the FMS has received training on the use of data from the Himawari-8, a Japanese meteorological satellite, for monitoring and forecasting severe weather in the region, such as tropical cyclones and heavy rainfall.¹⁹⁷ Council staff have been trained in basic GIS skills, and are currently digitising the available data for all buildings and preparing flood-risk maps (based on observations, rather than modelling) to identify vulnerable areas.¹⁹⁸

Future trainings should be undertaken to building capacity and awareness of all potential users, including central government agencies and sectoral ministries, and could focus on the data needs of specific sectors and reporting approaches. In particular, training should be provided to CCICD officials on the capabilities of EO and how it could be utilised for climate change projects. CCICD should also consider hiring a staff member to champion the use of EO data in the design, implementation and M&E of climate change projects and programmes. Capacity building has largely been conducted by development partners and regional organisations, and there is also scope for the University of the South Pacific, NDMO and FMS to undertake trainings for national stakeholders.

Additional recommendations for strengthening the processing and utilisation of EO data include:

- A countrywide survey on lidar should be carried out, which will be more cost effective than carrying out surveys for specific projects.¹⁹⁹
- Collecting and maintaining inventory information on communities, buildings and infrastructure will assist in quantifying the impacts of natural hazards. The Pacific Catastrophe Risk Assessment and Financing Initiative database, which holds information about some assets and infrastructure in Fiji, should be updated, expanded and validated so it can be used to quantify all natural hazard risks. The location, purpose, value and condition of existing coastal protection assets should also be catalogued. Such information is important for asset maintenance and to upgrade programmes, and for decisions on future expenditure.²⁰⁰
- Data should be stored, maintained and secured centrally as an important resource for Fiji. A programme to maintain and update data in the database should be financed, given that assets and populations change over time.²⁰¹
- Where possible, data initiatives should capitalise on existing institutions and technical architecture for knowledge management.

196 UN ESCAP (2018), 'Good practices and emerging trends on geospatial technology and information applications for the Sustainable Development Goals in Asia and the Pacific'.

197 SPREP (2018), 'Regional Training on Analysis of Himawari Data with SATAID begins at Fiji Meteorological Service', available at: <https://www.sprep.org/news/regional-training-analysis-himawari-data-sataid-begins-fiji-meteorological-service>

198 Government of Fiji (2017), Climate Vulnerability Assessment.

199 Government of Fiji (2017), Climate Vulnerability Assessment.

200 Ibid.

201 Ibid.

6.4 Climate change policies, strategies and plans

As outlined in Chapter 2, the GoF has developed a number of significant climate change plans and strategic frameworks in recent years, including the NCCP, NAP, NDC Implementation Roadmap, LEDS, the NBSAP 2017–2024, and the Green Growth Framework 2014.

The National Climate Change Policy 2018–2030 outlines a vision of a resilient and prosperous Fiji, in which the well-being of current and future generations is supported and protected by a socially inclusive, equitable, environmentally sustainable, net-zero emissions economy. The first pillars of the policy are that it is human-rights based and gender responsive.²⁰²

In addition, the Climate Change Bill was drafted in 2019. It has a focus on governance, the obligations of state entities, MRV, mitigation and adaptation priorities, and climate displacement, and will provide an essential legislative framework to guide and implement Fiji's many commitments, policies and programmes, ensuring transparency and accountability.²⁰³

Table 6.1 shows the present status of plans, strategies and policies related to climate change in Fiji. While significant progress has been made in recent years, the following actions are suggested to strengthen the design, development and implementation of climate change policies, strategies and plans:

- Provide a framework for prioritising actions in national and sectoral climate change policies, strategies and plans (with a focus on the strategies and plans found to have moderate/inadequate climate change components – as shown in Table 6.1). The GCF Country Programme is currently under development, with support from the World Resources Institute. This will not be titled as a 'GCF Country Programme'; instead it will be a Climate Change Country Programme that will be marketed to donors and development partners along with the GCF.

- While progress has been made over the past decade in mainstreaming mitigation, adaptation and disaster management measures into planning and budgetary processes in Fiji, including through the Pacific Risk Resilience Programme, strengthening of local government and subnational development planning processes should be prioritised.
- Efforts to undertake climate action will be strengthened, by giving greater support and resources to the enforcement of relevant existing legislation, policies and strategies.²⁰⁴
- This should include greater levels of monitoring and evaluation and understanding of climate change adaptation. For instance, under the NCCP, no progress reports or reporting were required for climate change-related projects across and outside of government.²⁰⁵

In addition to the policies and strategies currently in place, it would be beneficial to undertake the following actions:

- Review, update and endorse the National Energy Policy.²⁰⁶ Strengthen regulation and the enabling environment, in line with the Electricity Act of 2017, including by creating public–private partnership frameworks, strengthening the regulator and developing appropriate incentives.²⁰⁷ It is also recommended to create a long-term resilience strategy for the energy sector, underpinned by a climate risk model.²⁰⁸
- Design, prepare and adopt a policy for replanting of mangroves and building awareness in the private and public sectors.²⁰⁹
- A national reduce, reuse, recycle and recover policy should be developed and implemented to minimise waste going to landfill, and to encourage recycling and composting of household kitchen and green waste.²¹⁰

202 UNGA (2019), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*.

203 Ibid.

204 Government of Fiji (2018), National Adaptation Plan.

205 Ibid.

206 Government of Fiji (2018), Low Emissions Development Strategy.

207 Government of Fiji (2017), NDC Implementation Roadmap 2017–2030.

208 Government of Fiji (2018), National Adaptation Plan.

209 Ibid.

210 Ibid.

Table 6.1 Review of plans, strategies and policies²¹¹

Plan	Climate change component	Defined actions / outcomes	Costed actions	Responsibility allocated	M&E framework ²¹²
National					
National Development Plan 2017–2036	Strong	✓	X	✓	✓
Green Growth Framework 2014	Strong	✓	X	X	X
National Climate Change Policy 2018–2030	Strong	✓	X	X	✓
Nationally Determined Contribution 2015	Strong	✓	X	X	X
NDC Implementation Roadmap 2017–2030	Strong	✓	✓	✓	✓
Low Emission Development Strategy 2018–2050	Strong	✓	✓	✓	✓
National Adaptation Plan 2018	Strong	✓	X	✓	✓
CVA 2017	Strong	✓	✓	✓	X
Sectoral					
Fiji National Energy Policy 2013 (Draft)	Moderate	✓	X	X	✓
Maritime and Land Transport Policy 2015	Moderate	✓	X	X	X
Greater Suva Transportation Strategy 2015–2030	Inadequate	✓	✓	✓	X
Fiji REDD+ Policy 2011	Strong	✓	X	X	X
Fiji Agriculture Sector Policy 2020	Strong	✓	X	X	X
National DRR Policy 2018–2030	Strong	✓	X	✓	✓
National Biodiversity Strategy and Action Plan for Fiji 2017–2024	Moderate	✓	X	X	✓
Ministry of Health & Medical Service Strategic Plan 2020–2025	Strong	✓	X	X	X

211 Author's own analysis.

212 A number of plans include a high-level results framework, but lack indicators and sources of verification. A number of plans also state that a separate monitoring and evaluation framework will be developed to track progress.

Table 6.2 Criteria for reviewing climate change components of plans, strategies and policies

Status	Criteria
Strong	Provides an overview of mitigation/adaptation opportunities and barriers, and includes defined actions/outcomes to address mitigation/adaptation.
Moderate	Provides a limited overview of mitigation/adaptation opportunities and barriers, and/or includes limited actions/outcomes to address mitigation/adaptation.
Inadequate	Provides an inadequate overview of mitigation/adaptation opportunities and barriers, and/or includes inadequate actions/outcomes to address mitigation/adaptation.

- The National Waterways Policy should be used as the mechanism to develop an 'overarching' water resources management policy, which includes comprehensively managing flood risks, waterway resources and establishing institutional arrangements.²¹³
 - Develop a national-level systematic strategy that can identify and prioritise communities for relocation.²¹⁴
 - Regularly update and publish the National Environment Management Strategy and 'State of Environment Reports' on a five-year cycle, to inform development and disaster management planning processes at both the national and subnational levels.²¹⁵
 - Support the development of a research and innovation strategy that aligns research to national needs, and documents and disseminates best practice.²¹⁶
- Other challenges include a lack of financing to cover upfront costs to achieve low-carbon climate-resilient development; and limited co-financing for climate change projects, which could be exacerbated by COVID-19. The following actions are suggested to strengthen financial frameworks:
- GoF is receiving support from development partners to overcome these financial barriers, but long-term and in-country models of support should be expanded given the systemic nature of financial barriers. Therefore, the CCFAH technical assistance, with its model of long-term embedded support, will be appropriate and beneficial for the GoF.
 - Technical support can support Fiji to design, implement, and capitalise expanded financial instruments and modalities (including credit enhancement instruments, senior debt, bridging/subordinate debt, risk mitigation instruments, equity and incremental financial support). In addition, given that Fiji primarily receives development finance in the form of loans, there is a risk that increased climate finance flows could result in unmanageable debt levels (which is also exacerbated by the economic impacts of COVID-19).
 - Overcoming financial barriers and mobilising finance will help to implement national plans, strategies and policies. For instance, the NDC Implementation Roadmap identified a requirement of US\$2.97 billion in investments to implement necessary actions to meet Fiji's NDC targets.²¹⁷

6.5 Strengthening financial frameworks

In recent years, new fiscal and monetary mechanisms have been developed to address climate change and climate finance, for instance, green bonds and the Environment and Climate Adaption Levy, which are potential sources of co-financing. Fiji also faces a number of financial barriers to achieving action on climate change. Most notably, current climate finance flows are not meeting current or future needs, particularly with increasing climate change and natural disaster risks.

213 Ibid.

214 Ibid.

215 Ibid.

216 Ibid.

217 Government of Fiji (2017), NDC Implementation Roadmap 2017–2030.

- Climate finance is often delivered as 'off-budget' aid and is not adequately tracked by GoF financial systems. Tracking adaptation and mitigation measures would be greatly facilitated if budgetary processes were updated, so that climate change and environment-related initiatives can be accounted for and tracked in budgetary processes.²¹⁸
- Mobilising private sector investment is a priority, including the identification and development of financing modalities (e.g. formal arrangements such as public-private partnerships) to support private sector uptake of commercial proven measures at scale.²¹⁹ In order to implement the climate change measures prioritised in strategies and plans, the private sector will have to provide a significant contribution to reach required investment levels.

6.6 Private sector activities

Despite being a developing economy, Fiji has a well-established private financial services sector, private services/industrial sector, and consumer base. The private financial services sector includes at least six private sector banks operating in Fiji, along with the state banks, which are the Reserve Bank of Fiji and Fiji Development Bank. The private services/industrial sector is a large consumer of energy and includes international and national hotel chains, national commercial companies, and state-owned enterprises such as the Fiji Sugar Corporation and the Fiji Electricity Authority (FEA).

The GoF has established financial support incentives to increase the inclusion of renewable energy in power generation, the uptake of energy efficient vehicles, and improvements for energy efficiency in electricity consumption; examples include higher power purchase tariffs for renewable energy IPPs incentives and tax incentives. In addition, Fiji's sovereign green bond aims to raise a total of F\$100 million (US\$50 million) to support climate change mitigation and adaptation projects. Globally, Fiji is one of the first sovereign green bond issuers.²²⁰

There are a number of challenges remaining, including limited access to finance, the private sector being made up of mainly small and medium enterprises, and private sector entities seeing limited return on investment over the short term. To overcome these barriers, the following recommendations are suggested:

- Improve the availability of finance, by supporting private sector entities to access climate finance from both domestic and international financiers.²²¹ This could be achieved by providing support to identify opportunities and by supporting with proposal development/ bureaucratic requirements, which would result in reduced transaction costs.²²²
- Strengthen policy and regulation to reduce market distortions and increase the economic and financial attractiveness of climate related investments. Provide a conducive and enabling commercial environment (including by providing tax incentives, strengthening regulatory frameworks and reducing policy uncertainty) in order to make a good business case for adaptation and mitigation projects. This could also lead to further mobilisation of private sector finance.²²³
- Use financial instruments (such as investment guarantees) to reduce risk and strengthen investor confidence. As with other developing countries, investors in Fiji are affected by currency risk, operational risk, construction risk, and political, legal and regulatory risks.²²⁴
- Build the capacity of the private sector to respond to climate change – for example, by strengthening awareness, knowledge and technical capacity to implement waste-to-energy initiatives.²²⁵
- To strengthen co-ordination and collaboration between the GoF and private sector stakeholders, establish the Private Sector Advisory Board.²²⁶ This would create a space for developing and consulting on public-

218 Government of Fiji (2018), National Adaptation Plan.

219 Government of Fiji (2018), Low Emissions Development Strategy.

220 International Finance Corporation (2017), 'A Green Bond to Help Fiji Secure a Greener Future', available at: https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/cm-stories/fiji-green-bond-for-a-greener-future

221 United Nations Environment Programme (2015), Private Sector Climate Engagement Study.

222 Ibid.

223 Ibid.

224 Ibid.

225 Government of Fiji (2020), Third National Communication.

226 Ibid.

private partnerships, business development, and investment and financing opportunities in both mitigation and adaptation. The board, which CCICD plans to establish, would help to identify key issues relevant to investment and business planning, and would ensure that the private sector is updated in a timely fashion in relation to new initiatives, incentives, standards, regulations and risks.²²⁷

6.7 Stakeholder engagement

Strong stakeholder engagement is vital for achieving climate action, and this includes engaging with line ministries, provincial administrations, communities, NGOs and the private sector. Recommendations are suggested below for strengthening engagement:

- Achieve strengthened engagement between CCICD and line ministries on climate change. This will build support towards achieving climate-related sectoral goals and targets, ensuring climate finance is allocated towards achieving specific sectoral needs and co-financing opportunities are realised, and will mean the expertise present in line ministries is effectively utilised in project design and implementation.
- Engage provincial administrations in climate change processes. This will help to build capacity and strengthen understanding of climate change financing opportunities and requirements for developing and implementing low-carbon climate resilient activities.

- Engage communities, as appropriate, throughout the planning, policy and project cycle. Community beneficiaries should also be engaged in the design and implementation of climate change projects. Village co-ordination committees should be established to achieve these outcomes.²²⁸ The Fiji CSO/NGO community, which consist of partners ranging from small community/ church-based organisations through to large international non-government organisations (INGOs), should also be engaged to advocate on behalf of communities and other project beneficiaries.
- Develop a communications strategy to improve how CCICD and other key agencies with climate change responsibilities engage with stakeholders at all levels and across all groups. This was recommended as a part of the NAP process, but could be undertaken for all climate change actions. The purpose of the communications strategy would be to improve how the government engages with stakeholders at all levels and across all groups.²²⁹

6.8 Summary: assessment of climate finance by sector

The results of the climate finance sector-specific assessment are summarised in Table 6.3. The criteria used for undertaking this assessment are also described below in Table 6.4 and Table 6.5, and in earlier chapters of this report.

227 Government of Fiji (2018), Low Emissions Development Strategy.

228 Government of Fiji (2020), Third National Communication.

229 Government of Fiji (2018), National Adaptation Plan.

Table 6.3 Result summary of the climate finance sector specific assessment²³⁰

Sector / thematic area	Annual expenditure (2016–2019) ²³¹	Financing status	Financing priorities based on national plans, policies and commitments	Potential financing instruments	Potential sources of climate finance	SRS data application potential	Past SRS data utilisation	Status of plans and strategies ²³²	Key GoF agencies ²³³
Transport	F\$383 million	Limited progress: Further financing needed, particularly for mitigation actions.	Low-emissions transport projects, climate resilient transport projects, strengthening the enabling environment.	Grant and loan financing	GCF, MDBs; bilateral donors	High	Limited evidence of utilisation	Moderate	Ministry of Infrastructure and Transport Authority; Fiji Roads Authority
Energy	F\$55 million (electricity sector actions)	Limited progress: Additional assistance is needed, and improved data are required for tracking progress against goals and targets.	Increasing rural access and renewable energy generation, implementing energy efficiency measures, strengthening regulation and the enabling environment, undertaking capacity building.	Grants, concessional loans, equity and guarantees	GCF, GEF, CIF, MDBs, other multilateral agencies (e.g. UNDP, GGGI, IRENA), bilateral donors (e.g. MFAT, DFAT, JICA)	High	Successful utilisation for CF projects	Moderate	Department of Energy; Fiji Energy Authority

(Continued)

²³⁰ Author's own analysis.²³¹ Government of Fiji (2019), *Fiji Climate Finance Snapshot (2016–2019)*.²³² In relation to the climate change component of sectoral/thematic plans and strategies (see Table 5.1 for further information).²³³ Key government agencies responsible for implementing climate change projects are listed in this column. The engagement of wider stakeholders will be necessary for achieving improved outcomes in sectors/thematic areas, as outlined in section 5.7. This includes other government agencies (e.g. PMO, MIA), provincial governments, CSOs/NGOs, communities, private sector entities and development partners.

Table 6.3 Result summary of the climate finance sector specific assessment²³⁰ (Continued)

Sector / thematic area	Annual expenditure (2016-2019) ²³¹	Financing status	Financing priorities based on national plans, policies and commitments	Potential financing instruments	Potential sources of climate finance	SRS data application potential	Past SRS data utilisation	Status of plans and strategies ²³²	Key GoF agencies ²³³
Forests and land use	F\$4 million	Limited progress: Strong support provided on REDD+, but additional assistance is needed to achieve afforestation, forest conservation and restoration of degraded forests targets.	Afforestation and reforestation programmes, implementation of climate adaptation actions, development REDD+ institutions and processes, capacity building and training.	Grants, REDD+ finance	FCPF, GCF, REDD+ Pilot Programme, GEF, AF, CIF, UN agencies (FAO, IFAD and UNDP), MDBs, NGOs, and bilateral donors	High	Successful utilisation for CF projects	Strong	Ministry of Agriculture; Ministry of Fisheries and Forest
Waste	N/A	Limited data progress: Additional assistance is needed to achieve mitigation priorities.	Reducing waste emissions, strengthening climate resilience of waste systems	Grants, concessional loans	EU/SPREP (Pacwaste), MDBs (ADB & WB), and bilateral donors (e.g. JICA)	Low	Limited evidence of utilisation	N/A	Ministry of Local Government, Housing, and Environment; Water Authority of Fiji; Ministry of Health; city and town councils
Biodiversity and the natural environment	F\$58 million (actions on coastal ecosystems)	Limited data progress: Further assistance is needed to achieve NBSAP 2017–2024 and NAP 2018 outcomes.	Building climate resilience of ecosystems, scaling up of demonstration projects, undertaking further research to inform responses.	Grants	GCF, GEF, AF, UNDP, FAO, SPREP, SPC, NGOs (e.g. CI, IUCN), and bilateral donors (e.g. EU, France)	Medium	Limited evidence of utilisation	Moderate	Ministry of Local Government, Housing, and Environment

(Continued)

Table 6.3 Result summary of the climate finance sector specific assessment²³⁰(Continued)

Sector / thematic area	Annual expenditure (2016-2019) ²³¹	Financing status	Financing priorities based on national plans, policies and commitments	Potential financing instruments	Potential sources of climate finance	SRS data application potential	Past SRS data utilisation	Status of plans and strategies ²³²	Key GoF agencies ²³³
Livelihoods and disaster risk reduction	F\$197 million	Limited progress: Further assistance is needed to achieve NAP, CVA and DRRP objectives.	Strengthening early warning systems, improving evacuation centres and routes, strengthening institutional frameworks, and increasing support to building climate-resilient livelihoods.	Grants	GCF, GEF, AF, CIF, UNDP, MDBs (e.g. WB, ADB), bilateral donors (e.g. DFAT and MFAT)	High	Successful utilisation for CF projects	Strong	National Disaster Management Office; Fiji Meteorological Service; Ministry of Land and Mineral Resources
Resilient infrastructure	F\$6 million (housing sector)	Limited progress: Additional support is required to achieve NAP priorities.	Building and upgrading infrastructure and buildings (including housing), reducing risk from floods and coastal hazards to human settlements and the built environment, improving understanding of infrastructure exposure and vulnerability.	Grants, concessional loans	GCF, GEF, AF, CIF, UNDP, MDBs (WB, ADB) and bilateral donors (e.g. DFAT, MFAT and JICA)	High	Limited evidence of utilisation	N/A	Ministry of Infrastructure and Transport; Ministry of Local Government, Housing, and Environment

(Continued)

Table 6.3 Result summary of the climate finance sector specific assessment²³⁰ (Continued)

Sector / thematic area	Annual expenditure (2016-2019) ²³¹	Financing status	Financing priorities based on national plans, policies and commitments	Potential financing instruments	Potential sources of climate finance	SRS data application potential	Past SRS data utilisation	Status of plans and strategies ²³²	Key GoF agencies ²³³
Food security and nutrition	F\$33 million (agriculture sector)	Limited progress: Further assistance is needed to achieve the actions prioritised in the Fiji 2020 Agriculture Sector Policy Agenda and the NAP.	Climate-resilient crops, scaling up of climate resilient practices, implementing community extension models.	Grants	GCF, GEF, AF, CIF, FAO, UNDP, MDBs (e.g. WB, ADB) and bilateral donors (e.g. MFAT, AFD, USAID)	High	Successful utilisation for CF projects	Strong	Ministry of Agriculture; Ministry of Fisheries and Forest
Water supply and wastewater	F\$86 million	Limited progress: Climate finance projects are aligned with national priorities, but expenditure needs to increase to meet identified needs.	Improving planning, institutional and regulatory frameworks; assessing climate risks; upgrading, repairing, relocating and building new water and sanitation infrastructure; undertaking stakeholder engagement; and strengthening monitoring and evaluation.	Grants, concessional loans, equity and guarantees	GCF, GEF, Adaptation Fund, ADB, WB, UN agencies (e.g. UNDP), and bilateral donors (e.g. DFAT, KOICA)	High	Successful utilisation for CF projects	N/A	Ministry of Waterways, Water Authority of Fiji

(Continued)

Table 6.3 Result summary of the climate finance sector specific assessment²³⁰ (Continued)

Sector / thematic area	Annual expenditure (2016-2019) ²³¹	Financing status	Financing priorities based on national plans, policies and commitments	Potential financing instruments	Potential sources of climate finance	SRS data application potential	Past SRS data utilisation	Status of plans and strategies ²³²	Key GoF agencies ²³³
Health	N/A	Limited progress: Additional assistance is needed.	Identifying and planning for climate change risks in the health sector, controlling water-borne and vector-borne diseases, and developing climate-resilient health buildings and infrastructure.	Grants	GCF, GEF, and UN agencies (WHO, UNDP); for indirect health-related projects, the sources of financing will be varied	High	Successful utilisation for CF projects	Strong	Biosecurity Authority of Fiji; Ministry for Health & Medical Services

Table 6.4 Criteria for assessing SRS data application potential

Status	Criteria
High	<ul style="list-style-type: none"> Based on current technology and applications, there is a high potential for using satellite data to improve climate change outcomes.
Medium	<ul style="list-style-type: none"> Based on current technology and applications, there is a moderate potential for using satellite data to improve climate change outcomes.
Low	<ul style="list-style-type: none"> Based on current technology and applications, there is an inadequate potential for using satellite data to improve climate change outcomes.

Table 6.5 Criteria for assessing the status of planning institutions

Status	Criteria
Strong	Defined actions/outcomes, costed pipeline of projects, responsibility allocated, M&E framework.
Moderate	Contains some but not all of: defined actions/outcomes, costed pipeline of projects, responsibility allocated, M&E framework.
Inadequate	Poorly designed and/or minimal actions/outcomes, costed pipeline of projects, responsibility allocated, M&E framework.

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