Community-based Early Warning Early Action (EWEA) in the Pacific:

Findings from Palau

Red Cross Red Crescent Climate Centre

31st July 2022

Climate Centre

USP THE UNIVERSITY OF THE SOUTH PACIFIC | Shaping Pacific Futures

GOVERNMENT PRINCIPALITY OF LIECHTENSTEIN
MINISTRY OF FOREIGN AFFAIRS, EDUCATION AND SPORT

Acknowledgements

Research Team: The team was made up of researchers from the Tuvalu Red Cross Society (TRCS), University of the South Pacific (USP) and the International Federation of Red Cross and Red Crescent Societies (IFRC) as well as experts from the Red Cross Red Crescent Climate Centre and the University of Oxford's internship programme. The team was coordinated virtually due to COVID-19 travel restrictions and spanned seven countries (Fiji, Geneva, New Zealand, Palau, Tuvalu, the United Kingdom and Vanuatu). The research was made possible with support from the Government of Liechtenstein. The team would like to thank all the Palau interviewees, community members and partner organizations for taking part in this research.

Authors

Dr. Viliamu Iese (University of the South Pacific), Sayanti Sengupta (Red Cross Red Crescent Climate Centre), Jen Stewart Manu (IFRC Pacific), Leanne Harrison (Independent Consultant), Rebecca Brown, (University of Oxford), Tusi Finikaso (Tuvalu Red Cross Society), Vasa Saitala (Tuvalu Red Cross Society), Carol Emaurois (Palau Red Cross Society)

The report acknowledges special contributions from Dr. Meghan Bailey (Red Cross Red Crescent Climate Centre), Jioje Fesaitu (University of the South Pacific), Teresia Powell (University of the South Pacific), Nasoni Roko (University of the South Pacific), Kilima Kilima (Tuvalu Red Cross Society), Stephanie J. Minor (Palau Red Cross Society)

About the research

The research study on **Community-based Early Warning Early Action (EWEA) in the Pacific** has explored opportunities for strengthening EWEA in the Pacific, focusing on understanding local practices at the community level, while recognizing that these are often shaped by national and regional policy frameworks. It seeks to capture evidence on impacts as well as response mechanisms and identify ways to strengthen and build on these models. Research was conducted in two countries, Tuvalu and Palau, that were chosen as case studies to document existing strengths of EWEA systems on the islands. This information is expected to inform and shape the early stages of the Green Climate Fund (GCF) programme "Enhancing Climate Information and Knowledge Services for resilience in 5 island countries of the Pacific Ocean" due to start in 2022. Separate reports have been developed on the findings from the research in Tuvalu and Palau. This report focuses on typhoons and EWEA in Palau.

The data to inform the findings of the research in Palau was collected through desk review, youth survey, focus group discussions (FGD), consultations with Pacific Country Cluster Delegations, Red Cross national societies, and other key stakeholders in Palau.

About the GCF project

The GCF project identified that as Small Island Developing States (SIDS) in the Pacific, Cook Islands, Niue, Palau, the Republic of the Marshall Islands (RMI), and Tuvalu are at the forefront of increasing risks from the impacts of climate change. The GCF project seeks to address these issues with the facilitation and development of integrated climate and ocean information services and people-centred multi-hazard early warning systems (MHEWS) via inter-related project components such as: i) strengthened delivery model for climate information services and MHEWS covering oceans and islands; ii) strengthened observations, monitoring, modelling and prediction of the climate and its impacts on oceans and islands; iii) improved community preparedness, response capabilities and resilience to climate risks; and iv) enhanced regional knowledge management and cooperation for climate services and MHEWS.

The GCF project will seek to engage with last-mile communities to enhance preparedness and response actions at the grassroots level. The proposed interventions will focus on knowledge and capacity building to support the adoption of climate-resilient livelihood practices. This will be facilitated by the development of community-based disaster risk reduction and management plans, community level multi-hazard vulnerability assessments, assessment of community-level communications and response actions, and training and awareness workshops to enhance awareness of climate hazards and risks. This research aims to provide guidance on pathways for strengthening countries' community resilience in the following ways:

- Introducing Forecast-based Financing (FbF) in Cook Islands, Niue, Palau, RMI and Tuvalu.
- Showcasing FbF as an innovative mechanism whereby early actions are pre-planned based on credible forecasts and are funded and implemented before a climate shock to minimize losses and damages caused by climate-related hazards and reduce the need for humanitarian assistance in their aftermath.
- Developing FbF Roadmaps defining thresholds and triggers through stakeholder identification, risk assessment, impact-based forecasting (trigger analysis) and a resourcing overview.

- Capacity building for FbF involving research collaboration, technical support, EWEA activities, region-wide connections, table-top exercises, and financing mechanisms.
- Support on the development of Early Action Protocols (EAPs).
- Monitor and track where FbF mechanisms (with impact-based forecasting) can be a transformative means of improving disaster preparedness and enabling more efficient management of government budgets to promote the shift from traditional post-disaster response to pre-event early action.

Palau Red Cross teams conduct community engagement sessions during the Climate Risk and Early Warning Systems initiative in 2020

Table of contents

Abbreviations and acronyms

Alii CADRE	Alii Climate Adaptation Disaster Risk Reduction and Education Program
CBDRR	community-based disaster risk reduction
CCA	climate change adaptation
CCDRR	climate change and disaster risk reduction
CCG	Central Control Group
COFA	Compact of Free Association
CREWS	Climate Risk and Early Warning Systems
DEC	Disaster Executive Council
DRM	disaster risk management
DRR	disaster risk reduction
EAPs	Early Action Protocols
EDCR	Enhancing Disaster and Climate Resilience (through Improved Disaster Preparedness and Infrastructure)
ENSO	El Niño Southern Oscillation
EWEA	Early Warning Early Action
FbF	Forecast-based Financing
FDG	focus group discussion
GCF	Green Climate Fund
ICP	Incident Command Post
IFRC	International Federation of Red Cross and Red Crescent Societies
INGO	international non-governmental organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries
LEAPs	Local Early Action Plans
MHEWS	Multi-Hazard Early Warning Systems
MOE	Ministry of Education
mps	metres per second
NEMO	National Emergency Management Office
NDRMF	National Disaster Risk Management Framework
NEC	National Emergency Committee
NGO	non-governmental organization
NOAA	National Oceanic Atmospheric Administration
OFDA	Office of Foreign Disaster Assistance
PCCP	Palau Climate Change Policy (for Climate and Disaster Resilient Low Emissions Development)
PGEP	Progressing Gender Equality in the Pacific
PRCS	Palau Red Cross Society
PWD	Public Works Department
RMI	Republic of the Marshall Islands
SIDS	Small Island Developing States
SOPs	Standard Operating Protocols
SPREP	Secretariat of the Pacific Regional Environment Programme
TC	tropical cyclone
TRCS	Tuvalu Red Cross Society
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
VRK	Value Rules Knowledge Framework
WMO	World Meteorological Organization

Definitions

Here are some of the terms used frequently in this report:

Early Warning Early Action: 'Early Warning' means having the type of appropriate risk information, including traditional knowledge, for a wide variety of potential hazards including cyclones, droughts, floods and storms. 'Early Action' – also known as 'anticipatory action' and 'forecast-based action' – means taking steps to protect people before a disaster strikes based on early warning or forecasts. To be effective, it must involve meaningful engagement with at-risk communities (IFRC and Red Crescent Societies, 2022).

Knowledge is defined as "the mix of evidence-based (scientific and technical) knowledge and experiential, meanings-based knowledge that forms part of constructed knowledge systems in the decision-making process" (Gorddard *et al.*, 2016). Decision-makers make decisions based on the level of knowledge they have access to and the types of knowledge they choose to privilege: "Knowledge-based power is exercised in decision-making by preferencing some forms of knowledge over others; for example, the use of community-held knowledge of effects of past disasters over use of technical expertise to model changes" (Colloff *et al.*, 2018).

Rules include both 'rules in use' and 'rules in form', which relate to informal and formal rules respectively. The former includes norms, practices, taboos, habits and heuristics. The latter includes regulations, legislation, treaties and ordinances (Gorddard *et al.*, 2016).

Values are defined as "a set of ethical precepts that determine the way people select actions and evaluate events" (Colloff *et al.*, 2018; Gorddard *et al.*, 2016). Values are "important in determining our goals, world views, actions and preferences." Values can be influenced by factors such as tradition, culture and beliefs.

Tropical cyclone and typhoon: The Intergovernmental Panel on Climate Change (IPCC) defines a tropical cyclone (TC) as "a strong, cyclonic-scale disturbance that originates over tropical oceans," that is "distinguished from weaker systems (often named tropical disturbances or depressions) by exceeding a threshold wind speed. A tropical storm is a tropical cyclone with one-minute average surface winds of 18–32 metres per second (mps). Beyond 32 mps, a TC is called a 'hurricane', 'typhoon' or 'cyclone', depending on geographic location" (IPCC, 2014, p. 1774). 'Typhoon' is the commonly used terminology for this kind of storm in the Pacific region.

Executive Summary

The research study on understanding community-based Early Warning Early Action (EWEA) on the island of Palau was conducted from December 2021 to March 2022, with a focus on understanding the role of youth in EWEA. The youth were chosen as the target group for study to narrow down the research and to acknowledge and inform the specific vulnerability youth groups face from present and future climate change patterns, and the expected role they will play as agents of change in minimising some of the adverse impacts in Palau. The study relied on qualitative research techniques using tools such as youth surveys and focus group discussions (FGDs). The study finds that youth in Palau are already undertaking early action, being a key member in the shared household disaster decision-making and preparation process before and during a disaster. However, their main involvement pertains to one hazard namely typhoons.

The youth reported a lack of confidence and the opportunity to be engaged in EWEA leadership and would like opportunities to be included at the community level. They actively seek EWEA guidance through social media (Facebook) and this, at times, can lead to confusion and misinformation.

Moreover, youth with disability are currently marginalized from EWEA processes. Research on how best to bring their voices, needs and skills into EWEA will provide an opportunity to strengthen the resilience of communities and start to address the issue of stigma.

Youth want to be agents of change, protect their families and communities, and help those who are vulnerable to the negative impacts of disasters. By providing guidance on where to seek accurate information and how to be part of household- and community-level disaster management planning as well as systems for coordination, such as coordination groups and councils, youth could more be effectively engaged with EWEA.

Currently disaster information in Palau is focused on typhoons and a majority of the youth feel ‘prepared’ for them as they have experienced them before. However, they are not acting until a typhoon’s onset. Annual typhoon season preparation sessions and training to build confidence to act in advance would help ensure that youth are optimally engaged in typhoon EWEA.

Other hazards important for Palau include droughts, flooding, fluctuations in air temperature (extreme heat and cold), mudslides, sea-level rise and storm surges with varying impacts on the island residents based on where they reside. These events are experienced more frequently than typhoons, yet people are the least prepared for these other hazards. Further, resourcing at the household level appears insufficient to be able to cover the cost of preparatory activities and meet the cost of compliance with building codes. However, components of the EWEA systems such as Standard Operating Protocols (SOPs), phased warning triggers and pre-decided actions are not available for the multiple hazards that many people experience in Palau.

Finally, while youth are aware of immediate disaster risks, limited understanding of climate variability and change and the impacts on human health, food security, livelihoods and the environment were reported from the survey. With climate risks predicted to escalate in the near future and Palau’s acute vulnerability to the impacts, there is significant opportunity to raise awareness and educate the next generation of decision-makers to strengthen the skills needed to navigate ongoing and changing climatic shocks.

Introduction

Due to high exposure and vulnerability to climate variability, combined with the impacts of climate change in the context of disaster risk in the Pacific, EWEA is critical in this region. Ensuring that communities have access to appropriate information and can take action before, during and after disasters is a high priority. While many Pacific nations already have EWEA initiatives in place, these systems are not consistent. One of the primary aims of IFRC National Societies in the Pacific is to make anticipatory action a central pillar of disaster risk reduction in the region over the next decade. This research project advances that goal by examining the effectiveness of EWEA systems in Palau along with the experiences of communities and, in particular, youth in accessing and using these systems. It offers insights into the existing EWEA landscape in Palau and charts potential paths forward in building stronger EWEA for managing future climate risks. The report comprises a literature review and methodology section, followed by the findings. Data collection has been divided into four main sections:

i. an overview of the disaster and climate context in Palau

ii. an overview of policy and practices that influence EWEA interventions and approaches

iii. a summary of overall research results

iv. recommendations and opportunities for strengthening EWEA in Palau

Literature review

Climate change poses serious risks to the states of Palau. Since 1992, the United Nations Framework Convention on Climate Change (UNFCCC) has defined climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere. The Intergovernmental Panel on Climate Change (IPCC) defines climate change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer" (IPCC, 2014, p. 1760). However, it is important to note that the specific term "climate change" is a relatively recent one, born out of Western scientific discourse and lacks a direct translation or equivalent in many Pacific languages. Equally, indigenous scholars in the Pacific region have noted that many Pacific terms for ontological conceptualizations of the environment lack a direct equivalent in English (Tiatia-Seath *et al.*, 2020, p. 402). While specific terminology around climate change may vary geographically and culturally, hazards that are being exacerbated by climate change – such as increased instances of saltwater inundation, more severe cyclones, and prolonged droughts – are familiar hazards to inhabitants of the South Pacific, even if not explicitly identified as impacts of climate change (Tiatia-Seath *et al.*, 2020, p. 404).

The IPCC defines disaster as "severe alterations in the normal functioning of a community or society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery" (IPCC, 2014, p. 1763). The IPCC definition of a hazard is "The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources." The IPCC also notes that in the context of their work, the term 'hazard' typically refers to specifically climate-related physical events and their impacts (IPCC, 2014, p. 1766).

The impacts of climate change and related hazards in coastal communities have been well-documented in the Pacific. The nature and extent of impacts varies widely across social groups, with factors such as age, class, gender and disability playing complex and significant roles in outcomes related to hazards (World Bank Group & Asian Development Bank, 2021a, p. 15). Those who are already most vulnerable, including particular age demographics (such as children and the elderly), low-income communities, people with disabilities, and those facing other kinds of discrimination are at the greatest risk (Miles *et al.*, 2020, p. 27). There are several other initiatives underway to address the impacts and more detail is provided in Annex 7. No studies or programmes specifically focus on EWEA and the best way to empower communities to strengthen long-term resilience.

The literature review also identified:

- different types of disasters that affect Palau and their impacts, along with future hazard projections in the face of climate change
- key stakeholders in disaster management and the scope of their work
- existing approaches to EWEA in Palau, including both national- and international-level initiatives
- information gaps on EWEA in Palau

Methodology

This research aims to describe a country-specific approach to EWEA in Palau and inform the strengthening of community-level outcomes. This report includes the details of the Palau project, including the literature review, methodology, policy and legal frameworks, research findings, and lessons and recommendations for future EWEA development. Based on the findings, strategic and informed recommendations have been developed to support the upcoming Green Climate Fund (GCF) project entitled "Enhancing Climate Information and Knowledge Services for resilience in 5 island countries in the Pacific Ocean: Cook Islands, Niue, Palau, RMI and Tuvalu."

To understand the decision-making contexts in which EWEA takes place at the household-, community- and government-level, this study followed the 'Values Rules Knowledge' (VRK) framework in the research design process (Colloff *et al.*, 2018; Gorddard *et al.*, 2016). Interactions between contextually specific values, rules and knowledge frames decision options, constraining or enabling adaptation processes (Gorddard *et al.*, 2016). This is helpful for understanding how certain decisions are developed, and how the decision-making context could be influenced to enable the imagining of new decision options. Taking a strengths-based approach, aimed at identifying existing resources, systems and structures that help support communities facing hazards, this research has sought to identify the triggers for local action along with gaps and areas for improvement.

In its National Communications to the UNFCCC, Palau has identified its main vulnerabilities due to climate change as being related to increased coastal erosion, coral bleaching, drought, extreme high tides, habitat fragmentation, sea level rise, sea surface temperature rise, and storm activity (Climate Change Profile. Republic of Palau 2019). Given the range of climate hazards in Palau – and the fact that Palau was hit by major typhoons in 2012 and 2013 as well as severe droughts in 1998 and 2016, and in April 2021 Typhoon Surigae was one of the strongest typhoons to form in the Northern Hemisphere – this research explores the effects of multiple and potentially compounding or cascading hazard events (See box 1 below) on community action and preparedness. Having targeted early warning systems to trigger early action to prepare for typhoons and other hazards is paramount for strengthening the resilience of communities in Palau to withstand shocks and reduce the negative impacts of climate change.

Based on the initial literature survey, it was understood that several hazards have varying degrees of impacts on the people of Palau based on their predisposition. In the absence of strong infrastructure and institutions' responses, the role of communities in undertaking early action and reducing impacts will be crucial. The overarching research question underpinning this project was on **understanding existing community-based participation in early warning and action in Palau with a focus on youth engagement**. Questions were focused on understanding the underlying values, rules and knowledge that influence adults and youth in Palau to take steps to prepare for typhoons, which are predicted to increase in frequency and intensity under climate change, as was recently experienced by the population in April 2021 when Typhoon Surigae made landfall. This question was framed within a multi-hazard context in recognition that Palau experiences a range of hazards including coastal erosion, coral bleaching, drought, extreme high tides, habitat fragmentation, sea level rise, sea surface temperature rise and storm activity. There is also difference in the impact pathways and scope for EWEA for different types of hazards like fast onset (typhoon, flood, landslide, extreme high tides) and slow onset hazards (drought, coral bleaching, coastal erosion), and very slow onset (e.g sea-level rise, sea

temperature rise), as they require varying management approaches and planning. A full description of the assumptions this research was based on can be found in Annex 2.

The sub-research questions covered include:

1. Which early warning information and early warning systems (both formal and informal) are populations accessing (sources, types, frequency of information)?

2. To what extent are disaster-prone populations using the identified formal and informal early warning information and systems to make decisions and/or change behaviours at community , household- and individual-level? If not being used to make decisions or change behaviours, what are the barriers and limitations?

3. What existing pre-disaster behaviours occur at community-, household- and individual-level (both traditional practices and more recently initiated ones?)

4. What are the synergies between the early warning information populations are accessing, or could access in future, and the pre-disaster behaviours populations are already practising? Are there identifiable opportunities to better enable those synergies to reduce disaster impacts?

5. Which, if any, of these identified pre-disaster behaviours would be considered adaptive, maladaptive, coping or other?

6. In which ways could the identified pre-disaster behaviours be supported by external supports (e.g., FbF-type early actions) or a more enabling policy environment (e.g., legal frameworks, social protection)?

7. What forms of support are needed to strengthen early warning systems and FbF, including EWEA triggers and tailoring messages?

In addition, the following questions were included to understand the role of youth and EWEA in Palau:

1. What are the needs, experiences and value additions within the early warning and disaster space that are being contributed by youth?

2. What are the potential ways for youth to engage in the EWEA space, or ways to promote and nurture what youth are already contributing in this area?

3. What can we learn from youth climate champions?

The research used a mixed methods approach to investigate these research questions, using the following data collection methods.

© Palau Red Cross

Data collection

Remote data collection was led by national researchers, overseen by a senior researcher based at the University of the South Pacific in Suva, Fiji and supported by Red Cross agencies, personnel and partners.

- **Youth survey:** 52 youth surveys (63.5 per cent female, 32.7 per cent male and 3.9 per cent who preferred not to share their gender) were conducted using KoBotoolbox. Surveys were conducted remotely and questions covered the following topics: sociodemographic status, hazards and impacts, preparedness and early action, decision-making, information, and youth roles in disasters.

- **Stakeholder consultation:** Six critical stakeholders (3 females and 3 males) were met via Zoom from the following key EWEA agencies: High Chief, Ngaraard State; Office of Climate Change Policy; Ministry of Agriculture, Fisheries and the Environment; Ministry of Education, Belau National Museum, and the Palau National Weather Service (part of the National Oceanic and Atmospheric Administration).

Annex 3 provides a full outline of the mixed-methods research, which included the youth survey, stakeholder consultation, data synthesis and training of data collectors and facilitators.

Data analysis

Value Rules Knowledge Framework (VRK)[1]: The questionnaires for all methods were structured with the aim of understanding existing community-based slow-onset preparedness and early action practices for disasters, with a particular focus on typhoons, and the role of youth in this disaster. They specifically addressed the categories of 'values', 'rules' and 'knowledge' by:

- identifying some of the factors that contribute to local cultural decision-making contexts, thus shaping response capability, opportunities and constraints (**values**).

- assessing key policies, guidelines and SOPs across the national, district, community and household levels (**rules**)

- gathering information on the presence and efficacy of current early warning systems, including communication networks and links (**knowledge**).

VRK is a framework for analysing the decision context, emphasizing that social and institutional issues as well as knowledge and information can enable or limit decision-making. Interactions between values, rules and knowledge both limit choices and define possibilities for change in the decision context.

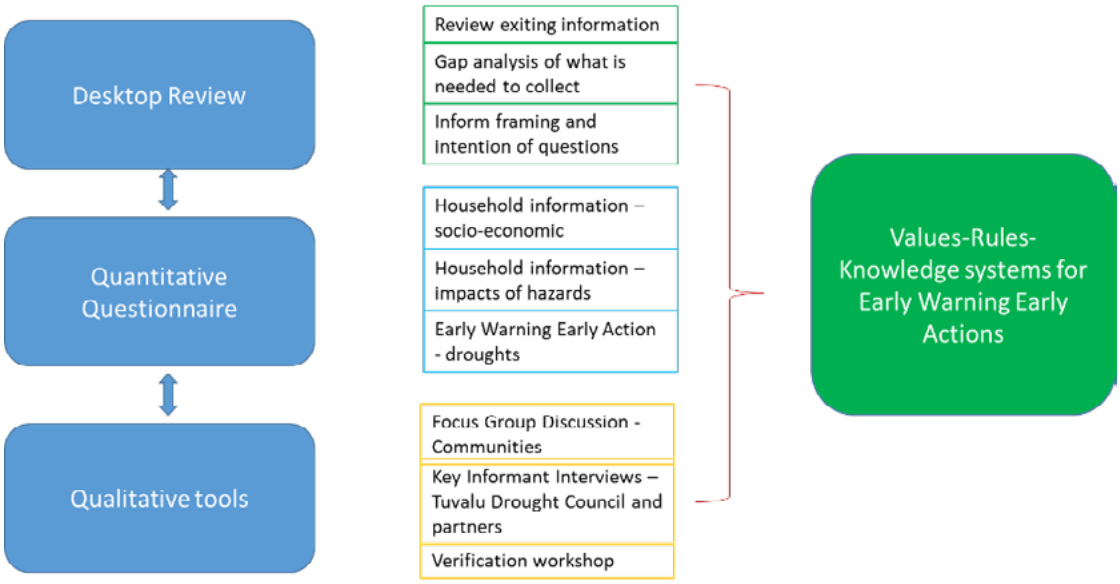
Thematic analysis: This process was conducted with the data collected to assess the understanding, processes and systems of EWEA for hazards among communities and stakeholders. The information was synthesized to account for the ways in which values systems,

1 VRK is a framework for analysing the decision context, emphasizing that social and institutional issues as well as knowledge and information can enable or limit decision-making. Interactions between values, rules and knowledge both limit choices and define possibilities for change in the decision context.

knowledge systems and rules inform EWEA processes for different groups. The research team held workshops to review the data and apply these categories to the findings.

The following infographic outlines the methodological framework for VRK which was applied to the research in Palau:

Figure A. Methodological framework for EWEA in Palau
Source: Iese *et al.*, 2021



Limitations

Below are three key method limitations:

The scope of the research: The GCF project covers five islands and selecting two countries for this research is an inherent limitation. Every country in the study has unique cultures, development trajectories, economic realities, physical environments, political systems and values. While there are certainly many shared characteristics among the countries, and they some share regional governance structures (such as the Secretariat of the Pacific Regional Environment Programme (SPREP)), they are nonetheless highly unique. Therefore, it may be challenging to generalize research findings from specific islands. For this reason, the focus of this study has been to identify a replicable method for understanding the nexus of values, rules, and knowledge that triggers EWEA. It aims to develop an approach that could be applied in other contexts as well.

COVID-19 regulations and the inability to travel: Constraints managing the global COVID-19 pandemic made this relatively short and community-focused research a challenging endeavour with three main impacts:

i. The original research method included both community consultations and a verification workshop so that local stakeholders could cross-check and verify the findings. These two activities had to be removed from the method when Palau experienced its first cases of COVID-19 due to the Omicron variant and in-person research opportunities became infeasible.

ii. The inability to travel meant that the research had to rely solely on in-country resources. This meant time delays and communications challenges with local stakeholders and research team leads. More lead-in time was required for remote research as other work priorities and commitments hampered planning at all levels of local engagement. In Palau, the best way to engage and plan is in person at the appropriate level, rather than remote communication modalities from often junior stakeholders, and the time needed to arrange meetings and make arrangements was extended. Similarly, it was challenging to train local staff on research of this complexity, including the need to be certain that the intent of each question was understood, and that the expected approach was taken. While the local researchers were experienced in conducting youth surveys, a key limitation was their capability to virtually conduct discussions within a group around a topic. Instead, each stakeholder answered each question individually which resulted in consultations taking a longer time and limited flow or discussion amongst participants. Capacity building is required to ensure they can facilitate group consultations where participants interact, take notes, interpret feedback, ask alternative questions to draw out linkages and cross-check information, together with capturing findings and undertaking analysis.

iii. Planning and coordinating among the lead research team members took significant time and effort. Not being able to work together in-person caused delays throughout the process due to time zone differences. Communication between different parties often took place via email chains, and often with key members in the field conducting other research or fitting meetings in between COP26 engagements. Despite these challenges, the team made the most of virtual communications with regular weekly and, at times, twice-weekly meetings to reduce turnaround times. Given that the research was commissioned by the Netherlands-based Red Cross Red Crescent Climate Centre, coordinated by the Vanuatu-based Pacific IFRC Disaster Risk Reduction (DRR) Coordinator in partnership with the Fiji-based USP PaCE-SD Research Fellow, supported by a New Zealand-based research consultant, and a United Kingdom-based Climate Centre Junior Researcher at Oxford University, with the research physically conducted in Palau, it has taken cooperation, partnership and commitment to produce this critical piece of research.

However, it should be highlighted that there were also opportunities posed by COVID-19, such as solely relying on in-country resources with the research being led and managed in-country. Other benefits included moving all data collection online which improved direct access, enabled greater context and expanded the reach of the research from a few easily accessible states to 12 states.

Ethics and approvals

In Palau there is a formal ethics or research approval process; however, it was not necessary for us to apply for approval because our research was not considered to be sensitive with private information or national security implications. Instead, the research followed IFRC ethical processes.

The IFRC has a Child Protection Policy and all researchers and volunteers have been trained accordingly and signed the policy. For the IFRC, the terms ‘youth’ and ‘young people’ cover all people in the age range of 5–30 years. This includes children (5–11 years old), adolescents (12–17 years old), and young adults (18–30 years old). In this study, all participants were above the age of 18, which is the legal age in Palau to be interviewed without parental consent. All traditional and indigenous protocols were carefully followed throughout every phase of the research, with the needs of the communities at the foreground throughout.

A more detailed explanation of the research methods, limitations and lessons learned can be found in Annex 3.

Findings

Section 1:
Setting the scene – the disaster and climate context in Palau

This section provides a brief overview of Palau's climate and disaster risk, and the institutional arrangements that frame climate change and disaster risk reduction (CCDRR) efforts.

Overview of climate and disaster risks

Palau is a nation made up of 586 volcanic and limestone islands in the South Pacific separated into 16 states. The main archipelago covers a 200 kilometre range (World Bank Group & Asian Development Bank, 2021a, p. 2). It is famous for its coral reefs and richly biodiverse marine ecosystems (Colin, 2018, p. 128). The largest rainforest ecosystems in Micronesia can be found in Palau, along with barrier reefs, seagrass beds and a network of mangrove forests (World Bank Group & Asian Development Bank, 2021a, p. 2). Environmental vulnerability in Palau is high due to the diverse, but limited, natural resources and fragile ecosystems, which faces pressure from tourism. The population of Palau is approximately 18,000 people (World Population Prospects - Population Division - United Nations, 2019). Only eight of the islands are inhabited by people, and 80 per cent of the population lives in the state of Koror (Center for Excellence in Disaster Management & Humanitarian Assistance, 2020, p. 14). Subsistence-based agriculture and fishing activities make up much of the country's national revenue (World Bank Group & Asian Development Bank, 2021a, p. 2). A growing tourism industry also used to contribute significantly to the economy until COVID-19 travel restrictions curtailed its development. Palau is also dependent on United States aid delivered through its 1986 50-year Compact of Free Association (COFA) with the United States.

A multi-hazard approach

The impacts of different hazards may coalesce and build off of each other (what climate modellers refer to as 'compounding or compound hazards'), such as concurring heat waves and tropical cyclones (Matthews *et al.*, 2019, p. 602).

It is important to note that definitions of hazards, disasters and risk levels are subjective; the way in which a policy body defines disasters, hazards, and risk levels may be different from the way that a community defines them. For example, in the article "Compound, Cascading, or Complex Disasters: What's in a Name?" hazards and vulnerability scholar Susan L. Cutter explores some of these complexities. 'Compounding' hazards are hazards that overlap with each other in the same timeframes and/or geographical location, interacting with and exacerbating each other.

Cutter observes that the process of identifying compounding events as primary, secondary and tertiary according to event temporality "has an inherent bias" and can "misleadingly prioritize the actual timing of the event over the damage or impact" (Cutter, 2018, p. 19). For this reason, comprehensive multi-hazard risk and impact assessments must seek to conceptualize and analyse hazards beyond the linearity of causal hazard chains (Cutter, 2018, p. 19). Consultation with impacted communities is essential to this process, including to highlight the role of social justice and traditional knowledge. This research has started the process of understanding how EWEA can support communities in Palau experiencing multiple or cascading hazards.

Palau is particularly vulnerable to the effects of disaster and is already feeling the acute impacts of climate change. Natural hazards such as droughts, typhoons, sea level rise and storm surges are ranked 'high risk'. Earthquakes and tsunamis are ranked 'low risk' (National Disaster Risk Management Framework (NDRMF), 2010). Climate change is predicted to increase disaster risk and has implications for disaster preparedness and risk reduction. Climate change and exacerbating rates of disasters are expected to disrupt many aspects of life in Palau. Those who are already vulnerable –including children, the elderly, low-income families, and individuals with disabilities – are at greater risk from extreme weather and climate events (Miles *et al.*, 2020, p. 27). Research also shows gender roles provide differences in women's and men's vulnerability to climate change due to gender-based differences in access to assets and credit, limited access to policy discussions, limited sex-disaggregated data, time use, and treatment by formal institutions (World Bank Group, & Asian Development Bank, 2021a).

Climate change poses many threats to the country, including coral bleaching, droughts, storm activity, intense rainfall, ocean acidification, sea-level rise and temperature changes (World Bank Group, & Asian Development Bank, 2021a). Key climate change issues affecting Palau include declining ocean ecosystem health, hotter conditions, stronger typhoons, and threats to coastal infrastructure. These impacts have direct and indirect impacts on natural and human systems as well as on the economy. Major environmental issues and threats relating to climate change have increased drastically over recent years. Palau's climate is hot and humid (average relative humidity is 82 per cent), with the mean daily air temperature at around 28°C. The main wet season is between May and October, with June and August having the largest rainfall. Rainfall can also vary between years, the result of an El Niño Southern Oscillation (ENSO): El Niño years are drier, La Niña are, on average, wetter (Climate Change Profile, 2019). The annual dry season is from January to March, which reduces the quality and quantity of potable water available to local communities. Palau suffered drought as a major disaster in 1998 and 2016, and high ocean temperatures in 1997 and 1998 which caused mass coral bleaching (Center for Excellence in Disaster Management & Humanitarian Assistance 2020, p.26).

Drought and typhoons are the most high-risk disasters in Palau. Palau has a history of experiencing super typhoons including Typhoon Bopha (2012) and Typhoon Haiyan (2013). The most recent example of the impact of climate change induced intensifying typhoons was on the 13 April 2021 when Typhoon Surigae passed over the north of Palau, close to Kayangel, with all 16 states being affected by excessive rain and high winds. Typhoon Surigae was the strongest typhoon experienced in the Northern Hemisphere and the most intense on record according to the National Oceanic Atmospheric Administration (NOAA) (IFRC DREF, 2021 p.1). Wind speeds of up to 126 kilometres per hour caused heavy rainfall and swells (23 metres high at their peak), power outages, communication service disruptions, water cuts, fallen debris, road blockages and landslides. It is estimated 1,500 houses were damaged along with belongings and farming investments.

Palau has already done considerable work to identify priority interventions for reducing the impact of climate change, including in mitigating risk such as reducing greenhouse gas emissions, improving the climate and disaster institutional framework, strengthening inter-sectorial coordination, and creating and empowering a Climate Change Office (Palau Climate Change Policy, 2015).

The COVID-19 pandemic has led to unprecedented adverse social and economic impacts, including the visitor numbers dropping and national debt growing. However, the Government also introduced a temporary jobs programme, private sector relief, unemployment benefits, and

a lifeline utility service programme for low or fixed-income households (EconMAP, 2021). While Government interventions went some way towards strengthening household and economic resilience, the pandemic has demonstrated the compounding impacts of adding yet another shock or disaster on top of the multiple challenges that vulnerable populations already face in day to day life.

Analysis of the main hazard types and projections in Palau are found in Annex 1.

Overview of governance

Key governing bodies

National Emergency Management Office (NEMO) is the central node in the Government system for disaster-related work. NEMO is responsible for the coordination and implementation of preparedness, response and the immediate relief arrangements in disaster settings. It works alongside all communities, agencies, sectors, stakeholders and departments in Palau to ensure that resources can be prepared and deployed to both respond to and mitigate the impacts of disasters (Government of Palau, 2016, p. 24). NEMO performs day to day operations associated with disaster management and submits reports to the Vice President. The National Disaster Coordinator is the coordinator of NEMO and assumes the control and coordination responsibilities of the National Emergency Committee

Disaster Executive Council (DEC): At the highest level, the DEC provides overall strategic direction and oversight for disaster management and response as well as declaring states of emergency. This body is chaired by the President (or alternatively Vice President) and comprises eight Ministers, a Council of Chiefs representative, the Chair of the Governor's Association, the President of the Senate and the Speaker of the House of Delegates.

National Emergency Committee (NEC) is responsible for disaster risk reduction policy and takes responsibility for the coordination of emergency response, including providing advice to the DEC (particularly on Emergency Declarations). The NEC also requests and coordinates external assistance. The NEC, chaired by the Vice President, comprises representatives from a wide range of government agencies along with non-governmental organizations (NGOs). During a disaster event, the NEC will operate from the National Emergency Operations Centre, which coordinates the Central Control Group (CCG) and the community-level Incident Command Post (ICP). NEMO provides administrative support for the NEC. The NEC can recommend that the President, through the DEC, should declare a state of disaster or state of emergency. Similarly, the NEC can recommend to the DEC the need for international assistance.

Within the NEC, there is a branch specifically focused on disaster risk management (DRM) in development planning and decision-making: the Hazard Mitigation Subcommittee. Through this subcommittee, NEC drives disaster risk management and the integration of socioeconomic concerns and environmental risk into national disaster plans. The Government of Palau defines its Disaster Risk Management Model as the following:

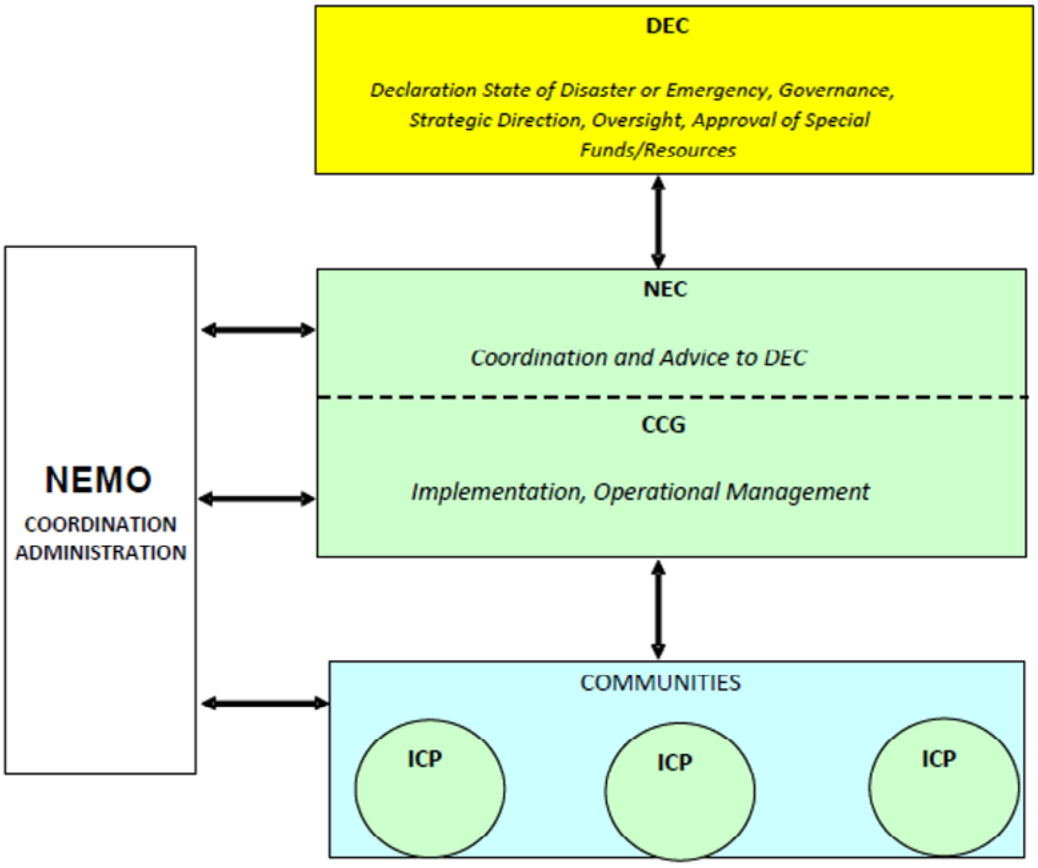
"The disaster risk management model that supports this Framework provides for an all-hazard, integrated, whole-of-government and whole-of-country approach that embraces all aspects of the disaster risk reduction and disaster management and requires the commitment of all levels of the community to engage in the conscious management of risk as an ongoing process to strengthen resilience and reduce vulnerability to hazards" (Government of Palau, 2016, p. 19).

It also explicitly recognizes that differences in experiences of disaster due to gender or vulnerability must be accounted for in DRM plans (Government of Palau, 2016, p. 22). NEMO is responsible for assessing the existing level of preparedness in communities and ensuring that disaster communication technologies are up to speed. It is also responsible for developing training programmes for all departments, sectors and agencies, alongside educational and awareness-raising materials for local communities (Government of Palau, 2016, p. 30).

The following Figure B represents a multi-level approach to emergency and disaster management. This approach to the management of incidents follows the National Incident Management System.

Figure B. Disaster and climate governance in Palau

Source: Center for Excellence in Disaster Management & Humanitarian Assistance, 2020. p. 32



Box 2: Traditional governance is integrated into national Government

Palau was traditionally governed by a Council of Chiefs, with a Chief for each village. This structure still exists today and has been incorporated formally into the Government of Palau, with Chiefs providing counsel on traditional affairs. Political and cultural affairs in each village take place in traditional hut structures known as bais (Center for Excellence in Disaster Management & Humanitarian Assistance, 2020, p. 15).

Section 2:
Lay of the land – Policy and practice in Palau

This section highlights relevant policies and funding arrangements relevant to disaster management in Palau – the context in which implementing agencies operate.

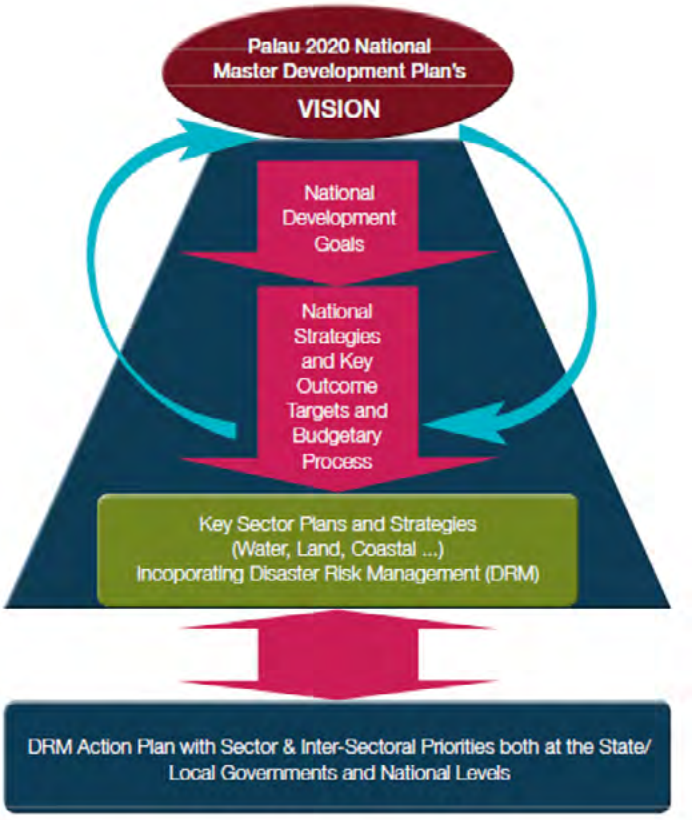
Overview of key policies, plans and frameworks

This section provides a high-level snapshot of the key policies, plans and frameworks for DRM and Emergency Management in Palau which incorporates guidance for EWEA. Outside the Presidential power to declare a state of emergency, as defined in the constitution, Palau has no formal disaster legislation.

Figure C depicts the vision of Palau's 2020 National Master Development Plan and the link between national development processes and disaster risk management principles.

Figure C. Key plans, policies and frameworks

Source: CFE-DM, 2020. p.39



The 2020 Palau National Master Development Plan aims to prevent or mitigate the impact of hazards on communities and reduce risks to development by changing social, economic and environmental conditions. At the national level, this requires that disaster risk reduction programmes and activities be incorporated into business plans and budgets. State-level disaster risk reduction programmes and activities should include identified priority hazards requiring attention as well as measures to deal with them are incorporated into the local government plans and budgets. At the community level, disaster risk reduction programmes and activities are to be developed and incorporated into programmes that address community development and coping mechanisms in times of disasters. In addition, relevant traditional knowledge and practices are to be included in the disaster risk reduction plans.

The National Disaster Risk Management Framework (NDRMF), mandated by Executive Order No. 287, was developed in 2010 and outlines priorities and processes for disaster risk management in Palau. The report is centred around the work of NEMO.

Disaster preparedness was listed as a high priority in the Framework. Government interventions included NEMO capacity building and the implementation of annual education programmes and simulation exercises. The development of Community Local Early Action Plans (LEAP) and community vulnerability assessments in Kayangel, Koror, Ngaraard, Ngardmau and Melekeok were identified as existing initiatives (Government of Palau, 2015, p. 15). The Government's stated vision is for vulnerable communities to "have the knowledge and understanding of the hazards and risks to which they may be exposed, in order to take appropriate actions to save lives and protect properties and the environment" (Government of Palau, 2015, p. 40). They have developed a tiered range of hazard responses, ranging from stage one (readiness) to stage five (stand down). From an EWEA perspective, stage one is likely to be the stage with the greatest potential for early warning development.

The document was amended in 2016, with the aim of "strengthening national disaster risk management structures and mechanisms to support the improved integration of disaster management and climate change adaptation to more effectively integrate disaster risk considerations into the national development planning and budgetary allocation process" (Government of Palau, 2016, p. 12). It is the responsibility of NEMO to ensure that the framework is updated as necessary.

Part 4 of the Framework focuses on national disaster risk reduction and states that DRR programmes should be "developed and incorporated into programs that address community development and coping mechanisms in times of disasters," adding, "relevant traditional knowledge and practices are to be included in all national, state and community disaster risk reduction plans" (Government of Palau, 2016, p. 40). It also states that post-disaster assessments should be used as an opportunity to identify the potential for developing future DRR initiatives.

The main objective of the Palau Climate Change Policy (PCCP) for Climate and Disaster Resilient Low Emissions Development, 2015 is to build the resilience of Palau to climate change and disasters. The objectives of the PCCP also reiterate and expand on those in the NDRMF. Additional objectives of the PCCP include:

- enhance adaptation and resilience to the expected impacts of global climate change across sectors
- improve Palau's ability to manage unexpected disasters and minimize disaster risk
- mitigate global climate change by working towards low-carbon emission development, maximizing energy efficiency, protecting carbon sinks and minimizing greenhouse gas emissions.

Palau submitted its Nationally Determined Contribution in November 2015 and its Second National Communication to the UNFCCC in 2013. Palau committed to a 22 per cent reduction in energy sector emissions below 2005 levels by 2025.

Overview of EWEA stakeholders in Palau

Palau has many important partners that provide humanitarian activities and disaster assistance and are coordinated through the NEC. The IFRC is the lead, together with the Palau Red Cross Society (PRCS) that represents its volunteers and the Palau Red Cross Society Youth Council. The Youth Council was established in July 2018 and targets 13–25 year-old youth with 107 registered members (CFE-DM, 2020). Youth volunteers provide more 10 hours a week assistance to the Society's programmes and activities.

The International Organization for Migration (IOM) is another key partner and works in coordination with the Ministry of Health.

NGOs are coordinated through the Belau Association of Non-Governmental Organizations that serves as the national body for NGOs and community-based organizations.

The main EWEA-related actors in Palau are noted in the table below. A comprehensive list with roles is provided in Annex 6.

International	National
▪ Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) ▪ Commonwealth Scientific and Industrial Research Organisation (CSIRO) ▪ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) ▪ Green Climate Fund (GCF) ▪ International Organization for Migration (IOM) ▪ Pacific Meteorological Council (PMC) ▪ Secretariat of the Pacific Regional Environment Programme (SPREP) ▪ The International Federation of Red Cross and Red Crescent Societies (IFRC) ▪ The Pacific Community (SPC) ▪ United Nations Development Programme (UNDP) ▪ United Nations Environment Programme (UNEP) ▪ United Nations World Food Programme (WFP) ▪ United States Agency for International Development (USAID) ▪ United States National Atmospheric Association (NOAA) ▪ World Meteorological Organization (WMO)	▪ Belau National Museum ▪ Bureau of Aging, Disability, and Gender (BADG) ▪ Bureau of Education Administration ▪ Bureau of Public Health ▪ Bureau of Public Safety ▪ Bureau of Public Works ▪ Bureau of Youth, Applied Arts & Career (BYAAC) ▪ Mechesil Belau (Women of Palau) ▪ National Communications Corporation ▪ National Emergency Management Office (NEMO) ▪ National Weather Service ▪ Office of Climate Change ▪ Omekesang Association of Palau ▪ Palau Red Cross Society (PRCS)

Red Cross teams plan community visits during the Covid-19 pandemic © Palau Red Cross

Current state of EWEA systems in Palau

NEMO is responsible for coordinating the regular assessment and reporting of available emergency communications and back-up communication resources for use in national disasters, including testing and preventive maintenance of these resources on a regular basis.

It is the responsibility of the NEMO to collaborate with the relevant agencies to activate and disseminate national warnings. It is also the responsibility of the NEMO to ensure that timely and appropriate messages are broadcast to the public, advising of the degree of threat and action that should be taken before, during and after the impact. The National Disaster Coordinator ensures that all messages are screened, and only urgent or essential service messages are broadcast throughout the stages of the activation process.

The national radio station, including private media services, serves as an important communication link with the community at large. Outlying states and remote areas are warned and or alerted through designated high frequency radios. These links are critical for the relay of information, and accordingly some control measures must be introduced to ensure that only essential broadcasts are made during periods of high threat.

There are many trusted online sources of information in Palau, both from within Palau and through international sources. Social media has also become a key source of information but, without being able to manage posts, is less reliable. Additionally, Palau uses Chatty Beetle – a portable iridium satellite terminal that allows text-based alerts and messages about potential weather hazards in remote locations, especially where communication options are limited. The device is virtually indestructible, built to withstand harsh, humid conditions and runs on a wide variety of batteries for ease of use.

Section 3: Summary of Findings

Sociodemographic information

Fifty-two participants were interviewed in the research, with 63.5 per cent female, 32.7 per cent male and 3.9 per cent who preferred not to share their gender. As for age range, most of the participants (30.8 per cent) were in the 18–19 age group. About 21.2 per cent were from the 23–24 age group, 19.2 per cent and 17.3 per cent were from the 20–21 and 21–22 age groups respectively. Only 7.7 per cent of the participants were aged 22–23 years old. The participants were from 12 different states in Palau. However, most of the participants were from the urban Koror state (23.1 per cent) and more participants were from Ngatpang (15.4 per cent) and Ngchesar (11.5 per cent) than the other nine states. In terms of employment, 53.9 per cent of the participants were employed, of which 53.6 per cent are female, 39.3 per cent are male and 7.1 per cent did not disclose their gender. Most of the participants (57.1 per cent) were employed in the government sector, 14.3 per cent were employed by the private sector, NGOs or were volunteering. The educational status of respondents showed that 65.4 per cent of the youth interviewed completed high school diplomas and 22.2 per cent completed their first degrees as the highest form of educational achievement. Of the 13.5 per cent educated only up to secondary and/or primary school level, all were female.

Hazards faced by communities

According to the primary data collected, there is a wide range of hazards faced by the communities. The most recent hazard recalled by participants was COVID-19 (34.5 per cent), followed by typhoons (24.3 per cent), mudslides (15.4 per cent), droughts (9.6 per cent), flooding (7.4 per cent), storm surges (5.2 per cent) and others such as climate change, sea level rise and increasing temperature (3.7 per cent). COVID-19 was mentioned as the most common hazard because the survey was conducted in Palau during the pandemic. Out of all these hazards, the participants felt best prepared for typhoons (30.7 per cent), COVID-19 (21.3 per cent), droughts (18 per cent), storm surges (10.7 per cent) and others (19.3 per cent). The participants felt that they were best prepared for outbreaks of COVID-19 and incidents of typhoons because they were happening frequently and there had been a lot of awareness-raising, training and action to help the communities learn and prepare. However, the participants were least prepared for hazards such as droughts, flooding, mudslides and the rather long term slow onset hazard like the sea level rise because of the lack of resources such as water tanks as well as a lack of knowledge, awareness and warnings. The study also found that participants were worried about the hazards that they were more exposed too. For example, the youth living closer to the sea were more worried about sea level rise and storm surges, while participants living closer to the rivers are more concerned about flooding.

Level of preparedness to typhoons

Ninety-four per cent of participants ranked their level of preparedness for typhoons as ‘quite well’ to ‘very well’. Only 6 per cent were either not well prepared or did not know how to prepare for typhoons. The high ranking given to typhoons was because the National Weather Service can detect typhoons days in advance, although the exact location of landfall is typically unknown until a few hours beforehand. Nonetheless, the typhoon forecast is generally well disseminated and includes preparation and response announcements, followed by coordination

activities with other partners such as the PRCS, NEMO and Office of the President. There is also a good level of awareness of where the evacuation shelters are and when to move to them. Even though many people felt they were well prepared for typhoons, improvements are needed in terms of raising awareness about maladaptive practices such as cutting down trees around houses as well as supporting people with resources and supplies to households while improving communications between government agencies and the community.

Concern about disasters

The percentage of youth concerned about disasters was 56.3 per cent. This was because they did not have sufficient resources or information to prepare. 9.9 per cent were concerned because they did not make decisions around preparation and 8.5 per cent felt unable to act or respond to disasters.

Impacts of disasters

Youth noted the biggest impacts of disasters for themselves as well as their communities was on their home (25.8 per cent) and power outages (25.6). 25.2 per cent recognized the biggest impacts of disasters were on food and water resources. The impacts on education and studies were considered the biggest impacts for 12 per cent of participants. About 6.9 per cent listed loss of livelihood and income, illness (5.7 per cent) and damage to farms as the biggest impacts of disasters on themselves.

At the household level, the biggest impacts were on power outages (23.5 per cent), home and community (20.5 per cent), reduced access to water and food (28.3 per cent), sources of livelihoods (9 per cent), illness and injuries (7.8 per cent), education/studies (7.2 per cent) and farms (3.6 per cent). The same findings were made at the community level.

Early action

Early action, as a concept, was reported as clearly understood by 76 per cent of youth survey respondents. The research also highlighted that decision-making on EWEA, after receiving a warning, was discussed as a family (69 per cent) with both parents (mother 35 per cent and father 29 per cent), and that all family members were active in preparation activities. For them, early actions were important to reduce the impacts of disasters including panic and indecision which cost lives and increase losses to properties and livelihoods. One crucial aspect of early action, according to the participants, was the ability to detect the hazards early and reduce the exposure and sensitivity of their households to the impacts – early detection, early warning and early action. This could also increase the household's ability to recover early and faster after disasters.

Youth expressed that following protocols and guidance from NEMO was important. They also noted that they carried out many preparatory activities once they received the early warning. Participants explained that they secured houses, roofs and windows and tied down light objects so they did not fly around during typhoons. Many of them were involved in purchasing food and other supplies to prepare before the typhoon's landfall. Another important role was looking after younger siblings while their parents stocked up on food and water and attended to other family

needs before the typhoon struck. They also prepared emergency kits and emergency plans for the households.

Youth showed that they acted and were integral to their family's response before, during and after a typhoon. Specifically, early action took place when the warnings were issued by the National Weather Service a few days before the typhoon landed. Very few prepared themselves at the start of the typhoon season. There were also no significant differences between gender and early actions with males and females performing the same activities.

The reasons youth took early action – or the values that drove them – were to prevent injuries, protect homes and save lives. Youth did not want to experience suffering from losses like they may have done in the past.

Decision-making for early action

At the community level, decisions on early action were made by government officials in the community, disaster committees and then the collective community. However, 62 per cent of the survey respondents also noted that they made independent decisions around whether to act for themselves. Answers to these questions showed that many knew what to do and were acting to protect their families and homes in lieu of adult guidance. Most preferred to act in consultation with their household (42 per cent) with many answers reflecting that such decisions were made collectively as a family, with only 6.8 per cent of youths leading on decision-making.

For the 62 per cent that made independent decisions on preparedness action, about 34 per cent reported that their decisions were influenced by community leaders (male, female). Around 23.6 per cent of the participants' decisions were influenced by the disaster committee, 16 per cent by government officials, 9.4 per cent by peers/friends and only 6.6 per cent by youth leaders. About 10.4 per cent believed their decisions were not influenced by anyone else. Most of the decisions were based on the information, awareness and knowledge provided by the disaster committee, PRCS, Government and elders. The elders had always taught the young people to be respectful and follow the instructions. Very few reported that they used their common sense to do what was necessary to protect their families.

Actions not taken

Many of the participants regretted not acting in previous disasters, including that they did not charge electronic equipment and power banks to prepare for power outages after the typhoon. Some critical learning from inaction included building strong new houses and having emergency kits at hand, rather than just stocking up on food. One important suggestion was to contact the Ministry of Education about preparing online learning resources that would enable youths to continue their education during and after a disaster.

The lack of action taken by participants to prepare for previous typhoons were cited as:

- lack of awareness of what to do and when to act, and when the electricity might go off
- lack of knowledge of how to prepare and what to do at home
- lack of influence at the community and national decision-making levels
- no employment or income to help purchase food and other supplies to prepare

- financial struggles and insufficient income to purchase food and other supplies to prepare
- lack of confidence and motivation to act.

All participants said that they had learned from the impacts of Typhoon Surigae in 2021 and wanted to contribute to increased awareness, resources and preparedness at the household level. The impacts of both COVID-19 and Typhoon Surigae were severe, and youths learned important lessons on the need to prepare and act to reduce the risks of future shocks. Again, there was no difference between male and female responses.

However, based on the information shared during the FDGs, everyone agreed that the issues experienced with Typhoon Surigae included a lack of communication; no clear understanding of how severe the typhoon would be; and no suggestions given for early preparation. Participants experienced mixed messaging; people were still at work and schools were still open at the time Typhoon Surigae passed Palau; and most people were lacking necessities for the typhoon and were generally unprepared. In contrast, for the more recent Typhoon Rai in December 2021, participants felt that there was 'over preparation'. Directives from NEMO to secure homes and stock up on canned food, water, candles, flashlights and power banks et cetera led many people to spend a lot of money; then Typhoon Rai dissipated on its way out of Palau. People were angry that they had been given wrong information and demanded more specific and accurate details next time.

Early warning information

28.7 per cent of participants felt that the internet and social media were the most common sources of information about hazards in their communities. 22.4 per cent used radio, while 20.1 per cent relied on word of mouth, family, neighbours and the community. About 12.1 per cent, 10.9 per cent and 2.9 per cent of respondents relied on community leaders, schools and churches respectively for early warning information. Only 2.3 per cent relied on biological indicators[2] and traditional knowledge while 1 per cent got their information from the Red Cross Disaster Action Team (R-DATs).

The types of messages received during early warnings included Facebook posts (38.2 per cent), official text messages (22.8 per cent), short radio bulletins (22 per cent), newspapers (13.8 per cent), tweets (2.4 per cent). In terms of usefulness and effectiveness, the Facebook posts (48 per cent) and official text messages (36 per cent) were noted as the best options. This implies that mobile phones are also useful sources of hazard information as well as early warning information in Palau. Twitter (35.4%) was considered the least effective source for early warning messages. About 96 per cent of participants were encouraged to take action when they received early warning information. The remaining 4 per cent preferred not to share their opinion.

When the participants were asked if youth preferred to receive information differently from other groups, 78 per cent answered 'no' or 'not sure', while 22 per cent answered 'yes'. Those who answered 'yes' shared that youth preferred to receive information through Facebook, social media and the internet more than older people. Youth also preferred to receive information on how to prepare for disasters/hazards through social media, Facebook posts/messenger,

2 Biological indicators refer to organisms, species or communities whose characteristics show the presence of specific environmental conditions, Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997

cartoons, text messages, school, and community gatherings. However, many participants were concerned about social media and Facebook as sources of early warnings and preparedness information due to the problem of fake news. They noted that false guidance leads to poor preparedness and confusion, which increases the negative impacts of hazards/disasters.

The FGDs noted that the communication of early warning information needed to be streamlined and should include all radio and TV stations to ensure identical messaging. There is also a need to increase the frequency of messaging, so that people can access the latest information every hour. It was very clear from the FGDs that clear communication during hazards or disasters was a major issue. The public needs to fully understand the messages so they can take appropriate action.

The role of youth in preparedness

When asked about the role of youth in preparedness in their communities, there was a range of responses from participants. Some felt there was no role for young people, as youth were simply expected to follow the elders and do as they were told. In contrast, many others explained that youths help to evacuate the elders and offer assistance to single mothers and other vulnerable groups before a typhoon. They also help to share information about the hazards with their peers and families. Some participants shared that this role is informal and, therefore, not well defined. Nonetheless, youths have important roles to play at the household-, community- and national-level – especially in helping to prepare, evacuate and clean up the community, while sharing information and building awareness about hazards and how to prepare for them effectively. Overall, the role of youth in preparedness for disasters needs to be clearly defined.

The range of responses on the role of youth in disaster preparedness is probably due to participants' lack of participation in youth groups/forums that focus specifically on disaster or climate management. About 48 per cent of the participants did not belong to a youth organization, school- or church-club with a focus on disaster or climate management. Only around 34 per cent of respondents were in youth organizations and 18 per cent were in school clubs.

When asked what current systems enabled them to take an active role in EWEA, involvement with the PRCS was the main conduit. Participants who were members of the Red Cross learned how to conduct damage assessments after typhoons and to distribute supplies, such as tents, to households in need. These participants also learned to advocate to their classmates, teachers and families the need and value in understanding and implementing early actions to reduce the impacts of hazards on their households.

Role of youth in communication of EWEA

Youth play a crucial role in communication of EWEA. About 35.4 per cent of participants felt that youth had an informal role in communication; 16.7 per cent referred to the roles as 'specific'; and 10.4 per cent reported having no role in communication. The remaining 37.5 per cent were not sure. There were many opportunities identified for youth to engage further in EWEA activities. These included joining organizations such as the PRCS as well as opportunities at NEMO and other organizations that offer training and capacity building in EWEA in Palau. In general, youth wanted to learn how to be agents of change in their homes and communities.

Suggestions were made by the participants on creating an enabling environment for youth to be engaged in EWEA activities. These included:

- joining the PRCS and other organizations
- seeking support from community leaders on the need to include youth in decision-making and other EWEA activities
- establishing youth groups at community and/or organizational level
- creating funding opportunities for youth programmes (training, activities, tools/materials development etc.)
- establishing a space in communities for youth as well as space at the 'table' for youth to participate in meetings, share information and become leaders in the community
- training and educating youths.

The FGDs identified that the main challenge of EWEA is receiving the right information in advance of an impending typhoon. One solution offered was for the youth to work with the existing Council of Chiefs in communities as, from here, information can be disseminated quickly and easily to every household. It is, therefore, recommended to build on this current system, instead of instigating a new one. It is also recommended that complimentary to the Palau National weather service, NEMO issues coordinated early warnings using its existing knowledge of the rainy months, typhoon months and dry season months. To date, youth engagement has not been a focus of EWEA messaging or programmes, except in September each year – known as 'Preparedness Month' – when NEMO conducts school visits with drills (Presidential Proclamation No. 19-256, 2019).

The survey respondents suggested establishing youth councils and youth groups; securing support from specific programmes for the groups such as training, active learning opportunities, and having targeted tools and materials; including youth in planning meetings and decision-making at community level; and offering youth opportunities to access training. When asked what current forums existed for youth leadership in EWEA, most respondents (80 per cent) were not sure. The only organization that cited was the PRCS. Two-fifths of the barriers to youth leadership in EWEA included the following: other youth not willing to engage; no system for collective youth action; youth don't feel skilled or experienced enough to contribute; and the experience and views of youth are not included or taken seriously.

Involvement of people living with disabilities

When participants were asked about their awareness of any youths with disabilities participating in EWEA, about 74 per cent answered 'no' and 26 per cent responded 'yes'. The 26 per cent 'yes' respondents said they were aware because: 1) people living with disabilities generally need assistance; 2) people living with disabilities have an active role in cleaning up the community after a disaster and providing supplies for their families before and after the event; and 3) there is a need for inclusivity among all members of the community. Only one participant noted the participation of the people living with disabilities in preparedness and early actions because they "saw people with wheelchair" during cleaning up exercises and workshops. The key barriers for inclusion of people living with disabilities identified by participants were: 1) a lack of awareness that there are different types of disability and that people living with disabilities have skills that can support EWEA; 2) a lack of knowledge on how to engage people living with disabilities; 3) a lack of appreciation of the challenges and needs of people living with disabilities; 4) a lack of resources to accommodate the needs of people living with disabilities so that they can be an active part of EWEA; and 5) a lack of communication and information to empower people living with disabilities as well as a feedback mechanism to hear their voices in consultations and planning.

"People don't always involve them because they think little of them. They see them as a bother rather than the help they're trying to give".

Section 4: Recommendations based on the findings

This section focuses on the ten key findings of the research as it pertains to community-based participation in EWEA, with a focus on the experience of youth in Palau.

1. **Learning from experience:** Almost 90 per cent of youth felt best prepared for typhoons and shared some good examples of preparedness. It was noted, however, that previous experience of the hazard was seen as an indicator of readiness. For example, youth shared many examples of the types of activities they undertook to prepare for typhoons such as preparing homes, stocking up on food, and listening to the latest warnings and information. Having experience of taking these different measures was counted as strong preparedness. Consequently, they felt the least prepared for hazards they had not yet experienced.

   "Most houses in Ngiwal are next to the shore and we are vulnerable to flooding. I haven't experienced storm waves so I wouldn't know what to do".

   To address this, it is recommended that an impact analysis of different hazards is conducted to capture the range of impacts that affect communities, especially for other hazards than typhoons. The research can be done as part of the larger GCF project or via other academic institutions interested in the topic. To address the impacts that are similar across the different hazards, community plans could be drawn up on replicating effective action, liaising with the council of chiefs in communities. Awareness also needs to be raised on how to manage less frequent hazards among the youth and in the community in general.

2. **Conceptualizing early action:** Seventy per cent of youth surveyed understood the meaning of taking early action; however, the time range within which early action should be taken was shaped by their experience of typhoons alone – i.e., more often than not in the hours immediately before landfall. While typhoon warnings can be a good trigger for last minute action, monthly and seasonal outlooks issued by NEMO or Palau National weather service would offer a longer term outlook on typhoon likelihood, intensity and severity to guide staged preparedness action. Furthermore, it would be important to look at the skill of such seasonal outlooks and analyse whether they would provide enough value to inform preparedness. In addition, there is a need to expand the idea that preparedness can take place months or weeks in advance and applies equally to other hazards.

3. Increasing resources: While SOPs are available for typhoons, resources to implement the actions needed were sometimes missing. 31 per cent of the respondents indicated that they did not have any major concerns when a disaster occurred as they were experienced with typhoons and familiar with SOPs. However, the remaining youth did have concerns, such as not having the resources to act (including income); not feeling prepared; not feeling empowered to make decisions; and, ultimately, not being able to act. Further research on resourcing and financing opportunities from national and international stakeholders is needed to enable households to implement SOPs.

   "An (SOP) has been set but need more manpower with above average skills to help out with operations".

4. **Preparing for other hazards:** While there were clear warnings of impending typhoons, these were not considered frequent or consistent enough across organizations. There also appeared to be limited messaging about the compounding impacts from typhoons on other hazards and how this affects different vulnerable groups. Youth noted, for example, that they were not familiar with preparing for mudslides, water security issues or drought conditions, even though these hazards occurred more frequently than typhoons. This is mainly because there is a lack of generic preparedness in the community for these hazards, as well as a lack of early warning messaging. Their communities and households were not resilient to these hazards – while there was general awareness that these hazards occurred, there wasn't any guidance or resources to prepare. To address this, the following steps could be taken:

    - Expand on youths' positive response to typhoon preparation with awareness-raising on multiple and compounding hazards. Education programmes should give clear EWEA messages including clear triggers for preparation.
    - Strengthen public messaging on EWEA for multiple hazards.
    - Strengthen education and awareness programmes on climate change and environmental impacts, including the indirect impacts on human health.
    - Further research is required to understand EWEA resourcing needs for a range of hazards as well as reviewing building code implementation and financing or loan opportunities to facilitate action.

5. **Improving decision-making:** Decisions to prepare for disasters were made collectively as a household. Youth did act independently where necessary, if their parents were absent during the onset of a disaster; however, decisions around when and how to prepare were generally made collectively by all family members who were then delegated certain tasks. Youth were often tasked to help vulnerable community members.

    "I have plenty of ideas of how we can prepare ourselves when we're encountering a disaster, but I usually share my ideas to my family before we decide to take any necessary actions".

    To better facilitate the process of decision-making, targeted awareness-raising and preparedness training would be beneficial. This means that when different demographic groups, or generations, come together for joint decision-making in the household, each group's needs, perspectives and aspirations can be taken into account. This would also provide a great opportunity for different groups to be further empowered to take on different roles around gathering and sharing information as well as in developing community early action plans.

6. **Improving participation**: Youth have agency, but it is underused in decision-making, leadership and participation. Overall, they have unacknowledged capacity at the household and community levels. Several examples showed youth willing and able to participate, lead and make decisions, but they faced barriers to taking action including being prevented from doing so by their parents, and feeling that they don't have a say, don't feel valued and are perceived as "not very strong". A recommendation here is to establish Youth Councils in the communities to help youth better define their roles and what they can do to help. Excursions and dialogues between different Youth Councils in Palau and other islands could foster shared learnings on best practice.

7. **Community youth leaders:** Based on the enthusiasm and commitment shown by the youth in Palau during this research, the study finds that there are many opportunities to engage, build capacity and use the skills and energy of young people in preparing for hazards. This could involve identifying existing and new avenues to engage youth; for example, by creating volunteer opportunities within government agencies for hands-on experience of disaster management. These volunteers could also be recognized as community champions by giving them a role in educating and raising awareness of hazard preparedness at the household-, community- and government-level. These community champions would act as agents of change by sharing information to help households and communities to prepare for disasters. For example, by preparing household-level disaster plans and response kits, and by contributing to community disaster planning.

8. **Leveraging information services:** The internet – particularly social media such as Facebook – accounts for 96 per cent of early warning information about hazards that is shared by youth in Palau. Youth are tech-savvy and prefer to source information quickly online, which they pass between their peers. However, almost half of youth surveyed had concerns about misinformation which could result in spreading real panic.

   "False information … leads the community to chaos and panic". "Fake news is very popular now and it cases panic, fear and major problems".

   To address this, priority should be given to sharing accurate information in a timely manner with youth. Opportunities exist for early warning actors to tap into the platforms that youth are most engaged in and to connect them with other groups and stakeholders. Moreover, engaging youth in developing key messages that resonate with other young people will ensure that the information builds trust and inspires action. Youth can also be engaged in promoting trusted online sources such as NEMO to ensure other young people know how to check the accuracy of social media posts.

9. **Inclusivity in preparedness:** young people with disabilities were not included in EWEA and their capacity was not acknowledged. 70 per cent of respondents said that they were not aware of any youth with disabilities participating in EWEA and there was often a discriminatory attitude towards disability within the community. A first step towards resolving this could involve a similar survey of young people with disabilities to understand their experience of EWEA. This could be followed by awareness-raising on the range of disabilities, addressing the stigma of people with disabilities as well as the positive role of youth and people with disabilities in EWEA. Opportunities should also be identified to engage all youth (including those with disabilities) in a dialogue about engagement, involvement and shared experience to break down current misconceptions.

Conclusion

There are significant opportunities to build on the progress that is being made in policies and practices to enhance community and youth outcomes in Palau, particularly given the current system for responding to typhoons.

When a typhoon is forecast, youth in Palau engage in lots of activities to prepare such as following NEMO protocols; securing loose items around the house; boarding up windows; arranging water containers; buying food and other essentials; fuelling cars; preparing emergency kits; reviewing family emergency plans; sharing warning messages; putting valuables in safety; cutting down trees/branches near to buildings; ensuring access to mobile credit for continuous updates on the impending typhoon; preparing for power outages; helping in the community; preparing mentally; and activating the community warning system (bells). It is evident that young people are heavily involved in responding to disasters; are aware of early action as well as the need for it; and are committed to minimizing the impacts of hazards in their communities.

However, the study finds that challenges exist in terms of mobilizing those young people who are unwilling to engage. Young people with disabilities are underrepresented to a large extent. Since there is no system for collective youth action, young people are involved in unconcerted efforts that are often not as effective as they could be. The youth also reported feeling unskilled or inexperienced to contribute effectively to disaster management.

Wrong information and warning given during previous typhoon experiences has also undermined the trust of the community in such systems and strengthening of the messaging and accuracy of information provided is needed at the institutional level. The involvement of the youth is crucial and the recommendations for engaging them in EWEA include investing in their upskilling and training; increasing avenues for working with disaster management agencies in Palau; and equipping young people with the right knowledge to impart awareness within their households.

The following table provides a summary of the key findings under the headings ‘rules’, ‘action’, ‘knowledge’ and ‘values’, along with opportunities for consideration by implementing agencies. Future phases of this research should seek to deepen the dataset and assess recommendations to link evidence to impact.

Table showing key findings and opportunities on EWEA in Palau, in line with the VRK Framework

Findings	Opportunities
Rules	▪ Update DRM and EWEA related plans and policies and identify actions to engage and build the capability of men, women, youth and people with disabilities. ▪ Ensure SOPs for multiple hazards at the different stages of onset, during and after disaster events.
Action	▪ Educate and raise awareness that typhoon warnings can be a good trigger for last minute action, but monthly and seasonal outlooks offer guidance on typhoon likelihood, intensity and severity over different periods to inform staged preparedness and effective early action. ▪ Expand on the effective action that youth already take in the immediacy of an incoming typhoon and use their experience of what happened when essential supplies were not sourced at short notice. ▪ Build on youths' positive response to typhoon preparation with awareness-raising on multiple and compounding hazards. Education programmes should give clear EWEA messages including triggers for preparation. ▪ Conduct further research on subsidies, incentives, loans and other resourcing opportunities to enable households to implement SOPs. ▪ Ensure targeted consultations and workshops on SOPs for typhoons are delivered to men, women, youth and vulnerable groups such as people with disabilities. ▪ Link best practice preparedness actions to those which are most efficient for recovery, particularly for youth; for example, continuity of education. ▪ Build the capability and use the skills and commitment of youth; identify existing avenues (e.g., PRCS, existing youth groups, church networks and school, sports and recreation activities) to engage youth and connect these with government taskforces for disaster management.
Knowledge	▪ Use the experience gained from typhoons to raise awareness of other hazards that communities are less prepared for. ▪ Arrange educational opportunities on climate change, disaster management plans, policies and SOPs for women, men, youth and vulnerable groups such as people with disabilities. These can be tailored to the geographical risks that different communities face. ▪ Strengthen education and awareness-raising programmes on climate change and environmental impacts including the indirect impacts on human health. ▪ Improve public messaging on EWEA for multiple hazards. ▪ Develop programmes or educational opportunities for women, men, youth and people with disabilities to receive timely warnings on hazards including at the start of the typhoon season, impending drought, flooding and other hazards. Facebook is currently the preferred method for receiving information by youth. ▪ Ensure youth know how to cross-check information on social media with trusted information sources such as NEMO and are aware of fake news and how to avoid spreading misinformation. ▪ Raise awareness at the household-, community- and government-level around the capacity of youth to build their confidence and skills to lead EWEA. ▪ Encourage youth to act as agents of change by sharing information that would help households and communities to prepare for disasters. For example, by preparing household-level disaster plans and response kits as well as contributing to community disaster planning. Youth also noted that they can be active in monitoring, drills and volunteering during humanitarian response activities. ▪ Engage youth in the development of key messaging e.g., early warning and preparedness messages to ensure tools and information is fit for purpose, increases trust and reaches target groups. ▪ Undertake a similar survey of youth with disabilities to understand their experience of EWEA. ▪ Identify opportunities to bring together youth (including young people with disabilities) for engagement, involvement and shared experiences to break down existing misconceptions. ▪ Develop and embed programmes that build awareness of the range of disabilities, address the stigma of people with disabilities, and raise awareness of the role of youth and people with disabilities in EWEA.

Values	▪ Expand on youths' positive response to typhoon preparation with awareness-raising on multiple and compounding hazards. Education programmes should give clear EWEA messages including triggers for preparation. ▪ Conduct further research on how to support preparation through subsidies and incentives; access to loans or grants could also be explored. Households have limited resource options for preparing for multiple hazards and this is limiting their ability to act. ▪ Empower different groups to take on various roles around gathering and sharing information as well as developing community early action plans. Decision-making should not be dominated by one group over another.

References

Center for Excellence in Disaster Management & Humanitarian Assistance. *Disaster management reference handbook,* 2020. https://www.cfe-dmha.org/Publications/Disaster-Management-Reference-Handbooks

Climate Risk and Early Warning Systems (CREWS). *Annual report 2020: Progress on early warning in a pandemic.* World Meteorological Organization, 2021.

Colloff, M., Gorddard, R., & Dunlop, M. (2018). The values-rules-knowledge framework in adaptation decision-making: a primer.

Colin, P. 'Ocean warming and the reefs of Palau'. *Oceanography*, 31, 2018. https://doi.org/10.5670/oceanog.2018.214

Cutter, S.L.' Compound, cascading, or complex disasters: What's in a name?', *Environment: Science and Policy for Sustainable Developmen*t, 60(6), 16–25, 2018. https://doi.org/10.1080/00139157.2018.1517518

EconMAP Technical Note. *The road to recovery: Further updating the economic impact of COVID-19 and strategies for mitigation in the Republic of Palau*, 2021. https://pitiviti.org/storage/dm/2021/05/rop-road-torecovery-2021-digital-remediated-20210525183628987.pdf

EM-DAT: The International Disaster Database. *Natural disasters in Palau*, 2011 to 2021, 2021. Centre for Research on the Epidemiology of Disasters-CRED. https://emdat.be/

Gorddard, R., Dunlop, M., Colloff, M. *The value-rules-knowledge framework in adaptation decision making: A primer,* 2018. DOI:10.13140/RG.2.2.13783.11688/2

Government of Palau. *Palau climate change policy for climate and disaster resilient low emissions development,* 2015. https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/laws/4834.pdf

Heim, R.R., Guard, C., Lander, M.A., & Bukunt, B. 'USAPI USDM: Operational drought monitoring in the U.S.-Affiliated Pacific Islands'. *Atmosphere*, 11(5), 495, 2020. https://doi.org/10.3390/atmos11050495

Hongo, C., Kurihara, H., & Golbuu, Y. 'Coral boulders on Melekeok reef in the Palau Islands: An indicator of wave activity associated with tropical cyclones'. *Marine Geology*, 399, 14–22, 2018. https://doi.org/10.1016/j.margeo.2018.02.004

Iese, V., Kiem, A.S., Mariner, A., Malsale, P., Tofaeono, T., Kirono, D.G.C., Round, V., Heady, C., Tigona, R., Veisa, F., Posanau, K., Aiono, F., Haruhiru, A., Daphne, A., Vainikolo, V., & Iona, N. 'Historical and future drought impacts in the Pacific islands and atolls'. *Climatic Change*, 166(1–2), 19, 2021. https://doi.org/10.1007/s10584-021-03112-1

Intergovernmental Panel on Climate Change. Annex II - Glossary. Edited by C.B. Field and V. R. Barros. In Climate Change 2014: *Impacts, Adaptation, and Vulnerabilit*y (p. 20), 2014. Cambridge University Press. https://www.ipcc.ch/report/ar5/wg2/

International Federation of Red Cross and Red Crescent Societies. *DREF final report. Republic of Palau: Typhoon Surigae*, 2021.

Mason, D., Iida, A., Watanabe, S., Jackson, L.P., & Yokohari, M. 'How urbanization enhanced exposure to climate risks in the Pacific: A case study in the Republic of Palau'. *Environmental Research Letters*, 15(11), 114007, 2020. https://doi.org/10.1088/1748-9326/abb9dc

Matthews, T., Wilby, R.L., & Murphy, C. 'An emerging tropical cyclone–deadly heat compound hazard'. *Nature Climate Change*, 9(8), 602–606, 2019. https://doi.org/10.1038/s41558-019-0525-6

Miles, W., Grecni, Z., Matsutaro, E., Colin, P., Keener, V., & Golbuu, Y. *Climate change in Palau: Indicators and considerations for key sectors*, 2020. https://reliefweb.int/report/palau/climate-change-palau-indicators-and-considerations-key-sectors

Murakami, H., Wang, B., & Kitoh, A. 'Future change of Western North Pacific Typhoons: Projections by a 20-km-Mesh Global Atmospheric Model'. *Journal of Climate*, 24(4), 1154–1169, 2011. https://doi.org/10.1175/2010JCLI3723.1

Presidential Proclamation No. 19-256, 2019. National Preparedness Month. https://www.palaugov.pw/documents/presidential-proclamation-no-19-256-national-preparedness-month/

Republic of Palau, *Climate change profile,* 2019. GCCA+/EU, SPREP, USP, SPC.

Republic of Palau. *National disaster risk management framework 2010* (Amended 2016). https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2016.pdf

Tiatia-Seath, J., Tupou, T., & Fookes, I. 'Climate change, mental health, and well-being for Pacific peoples: A literature review'. *Contemporary Pacific*, 32(2), 400–430,634,636–637, 2020. https://researchers.anu.edu.au/publications/157507

United Nations. *World population prospects,* 2019. https://population.un.org/wpp/

UNDP Pacific Office in Fiji. *Palau upholds gender equality, social inclusion in disaster risk management*, 2021. https://reliefweb.int/report/palau/palau-upholds-gender-equality-social-inclusion-disaster-risk-management

World Bank Group, & Asian Development Bank. *Climate risk country profile: Palau*. World Bank Group, 2021a. https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15820-WB_Palau%20Country%20Profile-WEB.pdf

Annex 1: Other key hazards in Palau

Palau faces a range of climate-related hazards, including sea-level rise, saline intrusion, drought, heat stress, tropical cyclones and storm surges. Their impacts in Palau are briefly outlined below.

Sea level rise: The IPCC defines sea level rise as changes that can occur both globally and locally due to alterations in the shape of ocean basins, a change in the mass of water in the ocean, or changes in the volume of the water due to changes in water density. A variety of factors can induce these alterations, including thermostatic changes (those pertaining to temperature). When thermostatic changes involve an increase in temperature, the ensuing increase in water volume and density is known as thermal expansion and leads to sea level rise (IPCC, 2014, p. 1774). Sea level rise is one of the hazards that Palau is facing. Anthropogenic greenhouse gas emissions are altering not only the marine temperatures but also the circulation patterns and chemical composition of oceans, posing serious risks to the health of marine ecosystems (Miles *et al.*, 2020, p. 23). Palau is home to one of the region's most comprehensive coral reef monitoring systems, involving a vast thermograph network across the coral reefs surrounding the islands. It is therefore a prime producer of quantitative data and knowledge pertaining to oceans temperatures in the Pacific (Colin, 2018, p. 129).

Saltwater intrusion/encroachment: Saltwater intrusion/encroachment occurs when fresh surface water or groundwater is replaced by saltwater. It is most common in coastal areas and estuaries (IPCC, 2014, p. 1772). This is one of the main hazards posed by sea level rise and storm surges in Palau. In Palau, which is topographically higher than some other small island states (such as Tuvalu), sea level rise could still have drastic impacts due to flooding. Most residents of Palau inhabit vulnerable coastal areas, and higher ground is not a feasible relocation site on many parts of the island due its hilly topography and dense vegetation (World Bank Group & Asian Development Bank, 2021a, p. 12). Many of the most densely populated areas of Palau are also located in some of the most flood-prone areas. These areas were chosen as locations for human settlements by colonial authorities because of their sea access and deep ports – characteristics which render them especially high-risk during flood events (Mason *et al.*, 2020, p. 2). Following World War II, increases in Palau's population due to migration led to a sharp increase in urbanization, leading to higher levels of risk during flood events (Mason *et al.*, 2020, p. 8). Saltwater intrusion also has devastating impacts on the agricultural activities in Palau, the majority of which are subsistence-based. Additionally, many sites of historical, cultural and religious significance in Palau are located in low-lying, vulnerable coastal areas. For example, officials in Ollei, Ngarchelong State, have observed that the holy site of Kukau El Bad – a site used to make prayers and offerings for a strong mesei (taro field) yield – is already being inundated during flooding events caused by sea level rise, storm surges and inland erosion (Miles *et al.*, 2020, p. 34).

Drought is another concern in Palau. The IPCC defines drought as "a period of abnormally dry weather long enough to cause a serious hydrological imbalance," noting, "drought is a relative term; therefore any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion" (IPCC, 2014, p. 1763). The IPCC definition of a meteorological drought is "a period with an abnormal precipitation deficit" (IPCC, 2014, p. 1763). Palau has experienced one meteorological drought in the last decade, which was attributed to El Niño. It started in October 2015 and ended in March 2016 (EM-DAT: The International Disaster Database, 2021). Given that precipitation is Palau's primary source of freshwater – providing 410 billion gallons of water annually – drought poses a serious threat to

water security in the country (Center for Excellence in Disaster Management & Humanitarian Assistance, 2020, p. 26). Drought is a particularly complex and multi-faceted disaster and can be categorized and defined in numerous ways. From a scientific perspective, droughts may be classified as meteorological, hydrological, agricultural, socioeconomic and ecosystem (Heim *et al.*, 2020, p. 2).

Heatwave: The IPCC defines a heatwave as "a period of abnormally and uncomfortably hot weather" (IPCC, 2014, p. 1766). Heatwaves are also likely to increase in frequency on Palau according to current models; the daily probability of heatwaves is expected to increase from 25 per cent in 2030 to close to 100 per cent in the 2070s. The Western Tropical Pacific has been identified as a global hotspot for future climate change-related marine heatwaves (World Bank Group & Asian Development Bank, 2021a, p. 9). In addition to severe, immediate impacts on human health, heatwaves pose concerns for the health of the ecosystem as a whole. For example, evidence shows that in Palau, higher night-time temperatures increase the rates of taro leaf blight – a highly infectious plant disease that is characterized by the formation of large brown lesions on the leaves of infected taro plants (Miles *et al.*, 2020, p. 28).

Tropical cyclones and typhoons are an increasingly serious hazard in Palau. Palau has experienced two typhoons and one tropical cyclone in the past decade. Typhoon Bopha occurred in Palau on 12 December 2012 and impacted 1,250 people. Typhoon Haiyan (Yolanda) occurred in Palau on 7 November 2013; the exact number of impacted people is not available. Tropical Cyclone Surigae occurred in Palau from 13–16 April 2021 and affected 7,288 people (EM-DAT: The International Disaster Database, 2021).

Storm surges occur when extreme weather events such as cyclones cause abnormally large waves which breach the shoreline. In Palau, Tropical Cyclone Surigae created waves that were 23 metres high. Approximately 300 people were evacuated to shelters by the PRCS with no lives lost, although an estimated 1,500 homes were damaged and 150 were destroyed. Power and water disruptions were widespread (IFRC, 2021). In addition to human mortality and morbidity, as well as infrastructural damage, cyclones can have impacts such as coastal erosion and salinization of soil. Current projections suggest that the severity and impacts of cyclones will worsen over time due to climate change. For example, the maximum windspeed of the most intense super typhoons is projected to increase from its present rate of 70–75 metres per second (mps) to 85–90 mps in the Northwest Pacific by the end of the 21st century (Hongo *et al.*, 2018, p. 20). Furthermore, climate simulations predict an eastward movement in the genesis point of tropical cyclones in the Northwest Pacific region (Murakami *et al.*, 2011, p. 1154). This shift would place Palau, which has not historically faced as many typhoons as some other Pacific Island Countries, more directly in the path of future storms (Hongo *et al.*, 2018, p. 15).

Annex 2: Research assumptions and considerations

The methods for the project were developed with three key considerations in mind:

1. In Palau, little literature has been published on EWEA systems. The Palau project was therefore focused on identifying the scope of current activities that could be classed as 'early warning' or 'early action', in order to develop ideas for future community-based EWEA development. The Palau project was focused specifically on the experiences of youth, as young people were identified as a vulnerable population in Palau by in-country researchers.

2. The focus of the project was not only to collect information on early warning processes, but to capture the ways in which early warnings trigger (or do not trigger) early actions across multiple scales: within households, communities, government and the private sector. Our aim was to understand the broader VRK contexts that influence knowledge production and decision-making processes for early warning and early action to reduce risk in Palau. This analysis will help the GCF to understand the existing strengths of EWEA projects in Palau as well as the gaps in these initiatives, enabling the development of contextually relevant and tailored support for addressing climate hazards and risks.

3. We opted to briefly gather general information about a range of hazards before agreeing with national stakeholders to focus on typhoons taking a multi-hazard approach. Typhoons were then investigated in-depth, with an eye towards the ways in which they intersect with and compound other hazards. Typhoons were selected because the main focus of the Tuvalu study was drought, enabling us to cover both a slow-onset and a sudden-onset events in our research on these two countries. Typhoons are also a recent hazard in Palau. For this reason, they were more likely to be fresh in the minds of most interviewees. Since the impacts of hazards can vary widely, this approach enabled us to gather in-depth information about typhoons and their relationships to other hazards. In the future, there is potential for further studies of other hazards in this region based on this model.

Annex 3: Detailed research methodology

This study sought to understand existing community-based participation in early warning systems and independent early actions as well as to investigate the value additions of youth in an EWEA system. The research used a mixed-methods approach. First, a desktop literature review was conducted. This review was followed by a youth survey as well as a focus group consultation with relevant stakeholders (local policy actors and service providers). Originally, it was planned to also hold semi-structured FGDs with community members along with a final verification workshop with stakeholders. However, due to an increase in COVID-19 restrictions in response to the Omicron variant in January 2021, these components of the method had to be adjusted due to social distancing and group gathering limitations.

Method 1: Youth survey

In Palau, in-person data collection was not possible during our research timeframe due to the impacts of COVID-19. Therefore, in adherence with national social distancing guidelines, an online KoBotoolbox survey was developed so that respondents could submit the survey responses themselves. The survey was formatted to be accessible on a range of personal devices including mobile phones. The survey was conducted during two windows of time to enable respondents to have live access to an online help chat room should they have questions or need support. The survey included emailed instructions and the IFRC Pacific Team facilitated the chat room. No requests for assistance were received. Participants were selected from existing youth networks at USP and IFRC across the country and the response rate was 99 per cent. Participants included 52 young adults aged 18–23 years. The youth survey guide can be found in the attached document titled Palau Research Tools in Annex 4.

The benefits of the need to adapt the approach from face to face to online meant that it was possible to access youth from 12 states, rather than the few states accessible from the capital, Koror.

The survey for youth on EWEA was developed to answer the following three questions:

1. What are the needs, experiences and value additions within the early warning and disaster space to which youth are contributing?

2. What are the ways for youth to engage in the EWEA space or ways to promote and nurture what youth are already contributing to this area?

3. What can we learn from youth climate champions?

The survey asked closed questions to gather quantitative information on the following topics:

- Which climate hazards respondents identify as most impactful on their families and communities and why.
- Impacts of typhoons in particular on their households, with a focus on typhoon-related losses.
- Warning systems and processes for typhoon, with a focus on triggers.
- The main sources of early warning information trusted and used by youth (government warnings on television and radio, school, church, social media etc.).
- Factors that enable or prohibit youth from acting in the face of hazards.
- Values, rules and knowledge informing decision-making processes at the household level.

Method 2: Stakeholder consultations

Again, due to COVID-19 restrictions, the stakeholder consultation took place online and this time via Zoom. The stakeholder consultation guide can be found in the attached document titled Palau Research Tools and included the following topics: organizational mandate and the role of policy; climate science; information and technology processes; systems and decision-making; and action.

The questionnaire for the stakeholder consultation covered:

- Roles of the stakeholders in addressing hazards generally in Palau.
- Roles of stakeholders in typhoon EWEA initiatives, with a focus on decision-making processes for EWEA.
- Lists of ongoing typhoon preparedness programmes and outreach initiatives, particularly the dissemination of warning information.
- Values, rules and knowledge that inform the roles of the stakeholders.
- Upcoming concerns, including the impacts of COVID-19 on capacity and service provision.
- The stakeholders' view on the role of youth in Palau's EWEA systems.

Participants included representatives from the following key stakeholders in Palau. Participants included three females and three males:

- High Chief, Ngaraard state
- Mr Joseph Aitaro, Climate Change Policy Officer, Office of Climate Change
- Ms. Gwendalyn Sisior, Acting Director, Bureau of Agriculture / EPCU Coordinator, Ministry of Agriculture, Fisheries, and the Environment
- Mr Keizy Shiro, Education Specialist, Ministry of Education
- Dr Ann Kitalong, Manager of Natural History Section, Belau National Museum
- Ms Maria Ngemaes, Director National Weather Service, Palau

The stakeholder consultation took place over two half-day workshops co-facilitated by USP researchers and the PRCS. The sessions were an opportunity for stakeholders to collectively share and verify information on their roles pertaining to typhoons and EWEA. It also enabled the stakeholders to obtain feedback from each other on the services they currently provide and the information they need to guide EWEA decision-making. This allowed them to discuss ways to strengthen their early actions communication across agencies and sectors, helping to reduce the negative impacts of cyclones and other hazards. Each participant was asked if they were willing to give their informed verbal consent prior to the start of the consultation session, including their consent for the Zoom meeting to be audio recorded.

Data synthesis

The questionnaires for all methods were structured with the aim of understanding existing community-based slow-onset preparedness and early action practices for disasters, with a particular focus on typhoons. They specifically addressed the categories of 'values', 'rules' and 'knowledge' by:

- Identifying some of the factors that contribute to local cultural decision-making contexts, thus shaping response capability, opportunities and constraints (values)
- Assessing key policies, guidelines and SOPs across the national, district, community and household levels (rules)
- Gathering information on the presence and efficacy of current early warning systems including communication networks and links (knowledge).

Data from the online youth survey was formatted on the KoBotoolbox App. Respondents submitted the survey on their personal devices. All data from the surveys was then transformed using the 'report' function of KoBotoolbox and uploaded to Microsoft Excel for analysis. Basic descriptive statistics of quantitative data were conducted. Common themes and key trends were tabulated for the report. All data was disaggregated based on gender.

For the stakeholder consultation, an interview guide was used as a foundation for semi-structured data collection. Stakeholder consultation notes were recorded and manually transcribed by the local researchers and further analysed with the rest of the research team. A thematic analysis of the stakeholder consultation data was conducted to assess the understanding, processes and systems of EWEA for hazards among communities and stakeholders. The information was synthesized to account for the ways in which values systems, knowledge systems and rules inform EWEA processes for different groups.

Training of data collectors and facilitators

PRCS volunteers in Palau are trained specialist data collectors and were selected for this research based on the following criteria:

- recent experience of conducting community-based surveys using gender-sensitive approaches
- competency in using the KoBotoolbox App to collect data
- familiarity with youth networks and other key EWEA stakeholders.

PRCS volunteers were coordinated by a Team Leader who was responsible for the data collection logistics as well as coordinating with all national stakeholders. The volunteers for this project were trained by the USP team specifically on the protocols for administering the research tools.

For the data collectors conducting youth surveys, the training covered:

- identifying youth networks; acquiring and signing of e-consent forms; the intention of each question; and the use of KoBotoolbox.

For the facilitators leading the stakeholder consultation, the training covered:

- selecting key stakeholders; acquiring and signing consent forms; the facilitation process; and the intention of each question.
- guidance on facilitating discussions; active listening; audio recording; and notetaking.
- transcribing interviews for analysis.

Annex 4: Palau Research Tools

Stakeholder Consultation Guide

Palau Stakeholder Consultation – Youth focus	
Consent as per all previous surveys	
Topic 1 Organizational mandate and policy	What is each stakeholders experience with Early Warning Early Action? Do you have a specific role in the EWEA process? What is it and how does it function? What policies do you have / use / abide by? Do these take a multi hazard approach? What is your experience engaging and working with youth in early warning early action – for example before Typhoon Surigae? What stories or examples of effectiveness and lessons learnt can you share around EWEA in general? What are the main challenges with hazard warnings? E.g. typhoon warnings What are the main challenges with taking Early Action? How does this apply to youth engagement?
Topic 2 Climate science, information and technology	What are the current typhoon projections for Palau? And what conversations/actions have been discussions to enhance preparedness? What drought tools for forecasting are in use? and in what time frame? By whom? What other **hazards** impact / have impacted EW information typhoons? What **information** is included in typhoon bulletins? what are your thoughts on this information? Who does it target? Who can access it? What role does **youth** play in this exchange of information? What stories or examples of effectiveness and lessons learnt can you share around sharing climate science and information? Where/what are the challenges and opportunities to improve? E.g. Technology, human resources, communication, climate services, language and mode of communication?
Topic 3 Processes, systems and decision making	Who is involved in raising awareness around typhoon information during typhoon Early Warning? What is the role of youth in this phase? Who has the most responsibility at national, state and community level? Where do youth roles connect? What is needed to improve the early warning process for typhoons? Do you see a role for youth/ already exists? What stories or examples of effectiveness and lessons learnt can you share around decision making, systems and processes? Any examples where you have seen effective youth leadership? Or where youth leadership is a gap? Where are the other gaps and opportunities to improve?

Palau Stakeholder Consultation – Youth focus	
Consent as per all previous surveys	
Topic 4 Action	What is the role of your organisation in typhoon actions (e.g. monitoring, reducing risks or response, recovery or build back better? Is it national, island or community level? or all of them?) Related to actions taken in the rapid typhoon onset phase; what are key lessons learnt, and why did those actions work or not? Are there examples of youth actions/ voices taking lead or being dismissed? What are the plans to reduce vulnerability to typhoons this year, next 5 years? Who is working on these issues, how? Where are the gaps and opportunities to improve?

Annex 5: Research limitations and lessons learned

This research is subject to several limitations which fall into two main categories: methodological limitations and limitations related to issues with the researcher(s).

Methodological limitations

The scope of the research being only two of the five islands included in the GCF project is an inherent limitation. Each country in the study has a unique culture, economic reality, development trajectory, physical environment, political system and values. While there are certainly many shared characteristics among the countries, and they share some regional governance structures (such as SPREP), they are nonetheless highly unique. Therefore, it may be challenging to generalize research findings from specific islands. For this reason, the focus of this study is identifying a replicable method for understanding the nexus of values, rules and knowledge that triggers EWEA. It aims to develop an approach that could be applied in other contexts as well.

Sample size and selection was limited due to the realities of the COVID-19 pandemic. Social distancing guidelines meant that data collection could only occur through online surveys. This was a limitation in the sense that it decreased opportunities for conversational qualitative data collection – because the data was not collected face-to-face in real time, follow up questions were not possible. However, this method also broadened our sample size and made the survey more accessible to a wide range of demographics.

Time constraints meant not being able to research EWEA preparedness in the same depth for all of the hazards facing Palau. For these reasons, the research was predominantly focused on typhoons. However, we also asked interviewees in both countries to self-identify the hazards that most impact them and their communities. If the findings of the research identify a need to independently explore EWEA for other hazards, then we will need a second phase of research to cover those additional hazards in-depth.

Limited access to data was a constraint as there was limited published or grey literature on EWS or EA in Palau. There was similarly little scholarship on gendered considerations related specifically to EWEA, disability inclusion in EWEA, or research on other vulnerable groups and EWEA in Palau. Therefore, the research was developed based on previous work on hazard impacts and climate change more generally.

Covid restrictions and the inability to travel made this relatively short and community-focused research a challenging endeavour with three main impacts:

i. The original research method included both community consultations and a verification workshop after the research so that local stakeholders could cross-check and verify findings. These two activities had to be removed from the method after the programme of research had started due to Palau experiencing its first cases of COVID-19 and in-person research opportunities became unfeasible.

ii. The inability to travel meant the research had to rely solely on in-country resources. There were time delays and communications challenges with local stakeholders and research team leads. More lead-in time was required for remote research as other work priorities and commitments hampered planning at all levels of local engagement. In Palau, the best way to

engage and make arrangements is in person at the appropriate level, rather than remote communication modalities from often junior stakeholders, and the time needed to arrange meetings and make arrangements was extended. Similarly, it was challenging to train local staff on research of this complexity, including to be certain that the intent of questions was understood and the expected approach was taken. While the local researchers were experienced in conducting youth surveys, a key limitation was their capability to virtually conduct discussions within a group around a topic. Instead, each stakeholder answered each question individually which resulted in consultations taking a longer time and limited flow amongst participants. Capacity building is required to ensure they can facilitate group consultations where participants interact, take notes, interpret feedback, ask alternative questions to draw out linkages and cross-check information, together with capturing findings and undertaking analysis.

iii. Planning and coordinating among the lead research team members took significant time and effort. Not being able to work together in person caused delays throughout the process due to time zone differences. Communication between different parties often took place via email chains, and often with key members in the field conducting other research or fitting meetings in between COP26 engagements. Despite these challenges, the team made the most of virtual communications with regular weekly and, at times, twice-weekly meetings to reduce turnaround times. Given that the research was commissioned by the Netherlands-based Red Cross Red Crescent Climate Centre, coordinated by the Vanuatu-based Pacific IFRC DRR Coordinator in partnership with the Fiji-based USP PaCE-SD Research Fellow, supported by a New Zealand-based research consultant and a United Kingdom-based Climate Centre Junior Researcher at Oxford University, with the research physically conducted in Palau, it has taken cooperation, partnership and commitment to produce this critical piece of research.

However, it should be highlighted that there were also opportunities posed by COVID-19, such as solely relying on in-country resources with the research being led and managed in-country.

Researcher limitations

Bias and translation errors are limitations of most research. Questions were thoughtfully developed with the intention of understanding the factors that facilitate or impede early action for hazard response. To minimize bias and leading questions, a mixed-methods approach was taken. Individual youth could answer with anonymity while groups could discuss their experiences with local researchers using a culturally appropriate approach and language. We were able to collect and collate the youth questionnaire survey data using KoBotoolbox, meaning that answers could be ranked or scored to facilitate the compilation of scaled results. The use of online survey methods meant that the team could not perform quality control assessments prior to data submission. The survey format also meant that the nuances of more complex qualitative questions could not be probed further during the data collection phase. However, the direct submission of data by interviewees also eliminated the need for any hand-written data collection or interpretive notes. Eliminating this middle stage decreased opportunities for bias or translation errors. The stakeholder consultation data was collected, recorded and transcribed by hand. The hand-written survey data was screened by the Team Leader for quality control before the data was uploaded into KoBotoolbox.

Differences in personal bias due to beliefs, customs, attitudes and culture have been partially minimized as the study has been conducted by local Palau volunteers trained in data collection. Furthermore, in Palau the information gathered from the youth surveys has been triangulated during the stakeholder consultations.

Limited access to key informants and even to the research team was also an issue given the short timeframe for the research study. Data collection occurred in January and February, which is typically a period during which people travel home and organizations close for the holiday season in the Pacific. Furthermore, PRCS volunteers involved with EWEA on the ground had been heavily engaged with response and monitoring after Typhoon Surigae in April 2021. Many staff were placed on enforced leave from December to avoid fatigue. In mid-January, Palau experienced its first cases of COVID-19 and in-person research opportunities became unfeasible. Several other hazards occurred in the Pacific during the research timeframe, including storm surges, cyclones and the January 2022 Hunga Tonga-Hunga Ha'apai volcanic eruption. These hazards caused delays for team members living in impacted areas or working to deliver support to impacted areas.

Annex 6: Palau stakeholders

Stakeholder	Sector	Key roles
Bureau of Aging, Disability, and Gender (BADG)	Government	Promotes gender equity and the interests of the elderly and disabled in Palau, including sensitivity to the experiences of these demographics in disaster contexts
Bureau of Education Administration	Government	Responsible for overseeing all public education institutions in Palau, including curriculum development
Bureau of Public Health	Government	Provides primary, preventative and promotive health services and information nationwide
Bureau of Public Safety	Government	Enforces legal rules and governance structures to protect the citizens of Palau
Bureau of Public Works	Government	Responsible for public infrastructure development and upkeep
Bureau of Youth, Applied Arts & Career (BYAAC)	Government	Promotes youth leadership in Palau, including youth involvement in disaster preparedness and response
Office of Climate Change	Government	The Office of Climate Change has been established as the central coordinating agency at the national level for all climate change-related work and has the mandate for the development, review and updating of the Palau Climate Change Policy as well as coordinating mainstreaming efforts across sectors and information knowledge management of national climate change information
Mechesil Belau (Women of Palau)	NGO	Traditional association made up of women leaders from each state; contributes to discussions about development issues across every sector in Palau
Palau National Communications Corporation	Private sector	Delivers the digital communication systems throughout Palau
National Emergency Management Office (NEMO)	Government	Responsible for overseeing all aspects of disaster management in Palau
National Weather Service	Government	Monitors information about weather in the region; identifies the need for cyclone/typhoon warnings
Omekesang Association	NGO	Promotes the interests of people with disabilities in Palau
Palau Red Cross Society (PRCS)	NGO	Delivers disaster planning, warnings, assessment and management
Ebiil Society	NGO	Assists the youth of Palau with protecting natural resources and livelihoods using indigenous knowledge
Pacific Community (SPC)	Regional organization	Supports the government in mainstreaming responses to the impacts of climate change

Annex 7 Current EWEA engagements

Literature on current EWEA projects in Palau is somewhat scarce, but there is evidence that EWEA is becoming a higher priority for both national and international actors.

Climate Risk and Early Warning Systems: One of the most prominent EWEA initiatives in the Pacific currently is CREWS, the World Meteorological Organization (WMO) specialized Climate Risk and Early Warning Systems (CREWS) Initiative, which operates in Least Developed Countries (LDCs) and Small Island Developing States (SIDS) including Palau. CREWS Pacific is co-funded by the Government of Canada with the aim of "strengthening hydro-met governance, mechanisms, and warnings in 14 states to alert and instigate behavioural change that minimizes risks to lives and livelihoods" (CREWS, 2021, p. 32). Additionally, hazard assessments were completed and analysed for impact-based coastal inundation flooding in the country (CREWS, 2021, p. 32).

A two-day Disaster Risk Management training workshop was held by NEMO In February 2021 in Palau's capitol of Karor. The training was focused on integrating gender, age, disability and cultural perspectives into disaster risk management policies and practices in Palau. The training was part of a United Nations Development Programme (UNDP) project entitled Enhancing Disaster and Climate Resilience through Improved Disaster Preparedness and Infrastructure (EDCR), initiated in 2019. The SPC contributed to the training initiative through its Progressing Gender Equality in the Pacific (PGEP) programme, which supports Pacific Island governments with gender mainstreaming initiatives (UNDP Pacific Office in Fiji, 2021).

A Healthy Living Summer Convention for Palauan youth was hosted in July 2018 by the PRCS. The objectives of the convention included educating participants on health, wellbeing, First Aid/CPR, disaster preparedness strategies, the functions of early warning system bells, and other disaster management procedures (Center for Excellence in Disaster Management & Humanitarian Assistance, 2020, p. 41).

A Community-Based Disaster Risk Reduction (CBDRR) toolkit was developed in 2016 by NEMO to be used as a guide by vulnerable communities. The guide was launched over a three-day training programme, and was focused predominantly on identifying disaster risks and early warning signs, communicating these risks within the community, and formulating community-specific action plans (Center for Excellence in Disaster Management & Humanitarian Assistance, 2020, p. 41).

Alii Climate Adaptation Disaster Risk Reduction and Education Program (Alii CADRE) was delivered in 2017 by the International Organization for Migration (IOM) in partnership with the Ministry of Education (MOE), Palau to increase resiliency in schools located in vulnerable communities. The programme included a training workshop for 49 teachers in partnership with the MOE. The training covered topics related to disaster risk reduction and climate change adaptation. IOM and MOE collaborated to produce four books entitled 'Climate Change', 'Typhoon', 'Tsunami' and 'Drought'. The books are being used across the country to provide hazard education to students in grades 6–8 and are also available online. IOM also assisted NEMO with a workshop on disaster preparation and response and helped to conduct needs assessments on, and create emergency communication systems in, 13 states (IOM, 2018).

The United States National Oceanic and Atmospheric Administration (NOAA), funded by USAID's Office of Foreign Disaster Assistance (OFDA), expanded its monitoring initiatives to include United States Affiliated Pacific Islands. The programme began with a drought assessment in each country including Palau and now involves the monitoring of precipitation levels in each country on weekly and monthly basis (Heim *et al.*, 2020, p. 2).