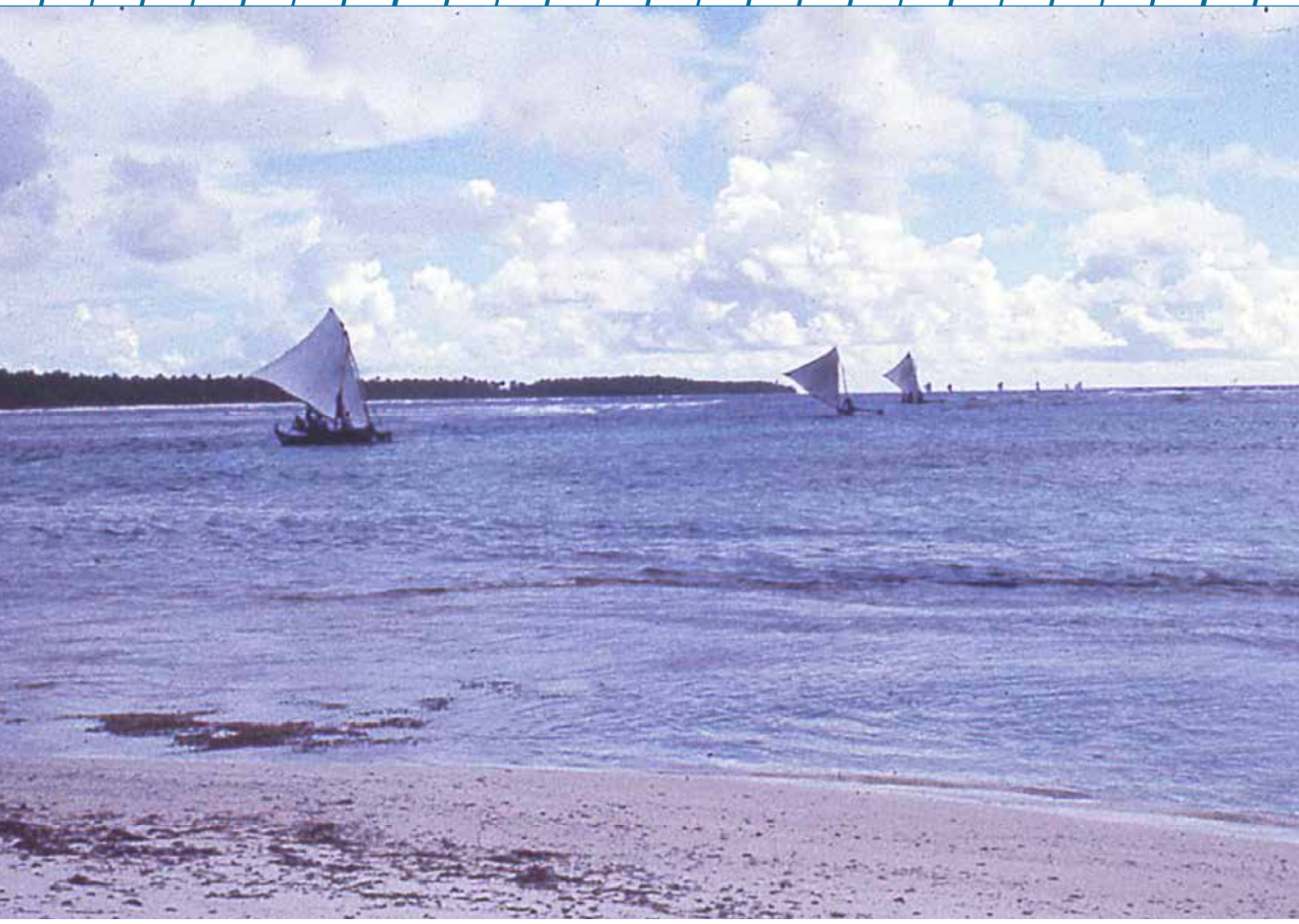
FEDERATED STATES OF MICRONESIA:
CHUUK JOINT STATE ACTION PLAN FOR DISASTER RISK MANAGEMENT AND CLIMATE CHANGE



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FOREWORD

The collective participation in the formation of our Joint State Action Plan (**JSAP)** from every sector of our society is an act of genuine leadership. As Governor of the State of Chuuk, I am humbled in presenting to you, for the first time, the Chuuk State ***JSAP*** in ***Disaster Risk Management and Climate Change***.

The responsibilities of leadership encompass dimensions in ideas, decision making, and learning. Going beyond essential trait of leadership is positive energy, the ability to energize others, and the ability to make tough calls.

Our goal with the JSAP is to help each and every one of us to front understanding and accept our responsibilities. If more of us will accept the responsibilities propose in new ideas, informed choices, and learning from the consequence of choice, our people will be better prepared to confront today and future challenges.

The JSAP is providing us with an overarching framework to address disaster and climate change risks within our state. A document that provided us to our understanding of the current risk and vulnerability and enhance plan of actions aim to lessen the impact of disaster and climate change risk over the next five (5) years.

The contributions made across Chuuk State by government representatives, mayors, traditional chiefs, church leaders, women groups, youth groups, and all are well acknowledged and recognized.

It is now our collective and sacred duty to focus understanding and accept our responsibilities. With that, I trust that Chuuk State will be better prepared to confront the complex and the ever changing challenges of disaster risk and climate changes today and into the future.

My hat is tipped in humble respects for a job well done.

Johnson S. Elimo
Governor
Chuuk State Government

August 09, 2017

ACKNOWLEDGEMENTS

The State leadership would like to acknowledge the support of all contributed to the development of this Joint State Action Plan for Disaster Risk Management and Climate Change.

The active participation of the various segments of our community was encouraging and reaffirms the concerns they are now facing and the eagerness to address risk to disaster risk and climate change. The contributions made by the government representatives, Mayors, Traditional Leaders, Church leaders, women groups, youth groups and persons with disabilities were very valuable and ensuring that the plan is realistic and relevant.

The leadership displayed by the Chuuk Disaster Emergency Operation Centre Coordination Office (CDEOC), FSM's Office of Environment and Emergency Management (OEEM) and the Pacific Community (SPC) is greatly appreciated in supporting the development of this plan.

The funding support from the European Union through the EU ACP Building Safety and Resilience in the Pacific (BSRP) project being implemented by SPC is greatly appreciated without which the development of the plan would not have been impossible.

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ACRONYMS

CCA	Climate change adaptation
COM	College of Micronesia
DRM	Disaster risk management
DRR	Disaster risk reduction
ENSO	El Niño–Southern Oscillation
EOC	Emergency Operations Centre
EPA	Environment Protection Authority
FEMA	Federal Emergency Management Agency (US)
FSM	Federated States of Micronesia
GDP	Gross domestic product
IOM	International Organization for Migration
JSAP	Joint State Action Plan
M&E	Monitoring and evaluation
OEEM	Office of Environment and Emergency Management
PIFACC	Pacific Islands Framework for Action on Climate Change 2005 – 2015
RFA	Pacific Disaster Risk Reduction and Disaster Management Regional Framework for Action 2005 – 2015
R&D	Resources and Development
SPC	Secretariat of the Pacific Community
USD	United States dollars

EXECUTIVE SUMMARY

Chuuk State's Joint State Action Plan for Disaster Risk Management and Climate Change (JSAP) was developed in April 2016, led by the Chuuk Disaster & Emergency Operation Centre (CDEOC), and supported by the FSM Office of Environment and Emergency Management (OEEM) and the Pacific Community (SPC) Geoscience Division.

The development of the Chuuk JSAP acknowledges the shift at the national and Pacific regional levels to address 'risks' in a holistic, integrated way. The Federated States of Micronesia's (FSM's) Nation Wide Integrated Disaster Risk Management and Climate Change Policy provides an overarching framework for FSM to address risks, requiring state governments to develop plans of action to address disaster and climate change risks. At the regional level, the development of the Strategy for Climate and Disaster Resilient Development in the Pacific – an integrated framework to address risk and vulnerability for the Pacific region is an example of such an approach. Chuuk's JSAP supports these national and regional efforts, providing the people of Chuuk with strategic, prioritised actions for the coming years to address risk across all sectors and segments of the community.

Through a participatory, consultative approach, the development of the JSAP included a range of stakeholder views concerning risk management, vulnerability, and actions to enhance Chuuk's resilience to disaster and climate risk over the next 5 years.

This document provides both an overview of the current risk and vulnerability context in Chuuk, as well as the state's strengths, including its strong traditional culture and rich natural resources. By drawing on such as assessment of strengths and weaknesses, Chuukese stakeholders developed actions across 6 Priority Areas, representing the main elements of their livelihoods they wished to sustain and strengthen in years to come.
The Priority Areas, and objectives under each, are found below. The full Action Matrix can be found in Appendix D, which details the specific actions under each objective.

1. Infrastructure
- Objective 1.1: Shoreline protection
- Objective 1.2: Improve infrastructure in Chuuk State to withstand disaster risk and climate change
- Objective 1.3: Infrastructure to support development / settlement in higher grounds

2. Agriculture and Forestry
- Objective 2.1: Mangrove planting for shoreline protection
- Objective 2.2: Mountain protection and rehabilitation
- Objective 2.3 Strengthen fire response
- Objective 2.4: Sustain productive agriculture

3. Private Sector
- Objective 3.1: Strengthen Private Sector capacity to support disaster preparedness and response
- Objective 3.2: Increase Private Sector awareness on disaster risk and climate change
- Objective 3.3: Encourage disaster preparedness and environment friendly actions through tax incentives

4. Environment
- Objective 4.1: Ensure water security for Chuuk
- Objective 4.2: Improve waste management and promote environmentally friendly recycling

5. Health
- Objective 5.1: Environmentally friendly sanitation coverage
- Objective 5.2: Health security for Chuuk

6. Education
- Objective 6.1: Skilled labour to support disaster and climate change preparedness and response

The total estimated costs to implement the priorities is USD 79,604,578 of which USD 77,320,597 comprises of the financial costs and USD 2,283,981 the in-kind contributions of the state and national government and regional organisations.

1. COUNTRY AND STATE CONTEXT

1 COUNTRY AND STATE CONTEXT

1.1 GEOGRAPHY

The Federated States of Micronesia (FSM – see Figure 1) consists of a total of 607 islands in the western Pacific Ocean, with an exclusive economic area of 2,980,000km2 and a total land area of 701 km2. These islands include small islets that disappear at high tide, coral atolls and large volcanic islands of more than 80km2. FSM is comprised of four states: Chuuk, Kosrae, Pohnpei and Yap, which each have a considerable degree of autonomy.

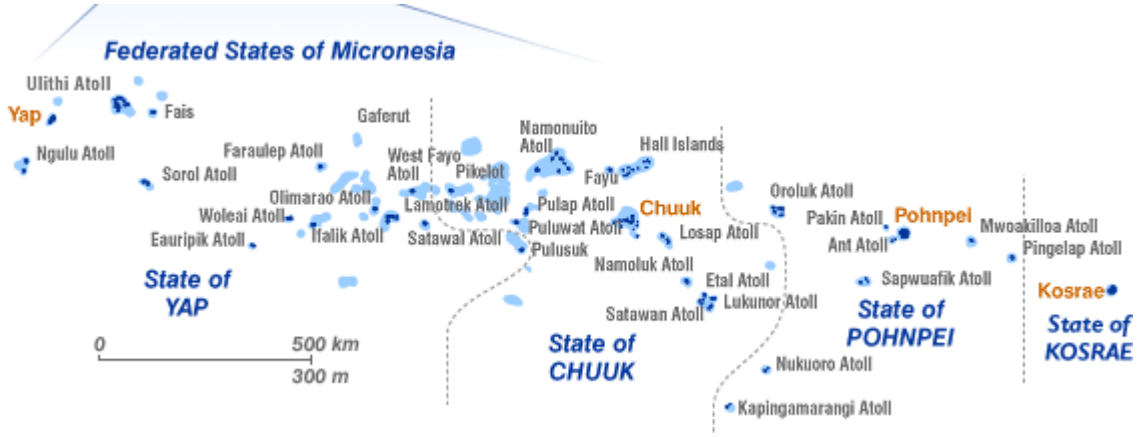


Figure 1: Map of the Federated States of Micronesia

Chuuk State (see Figure 2) is considered west FSM (although Weno, the main island of Chuuk can sometimes be considered as part of eastern FSM) and is located in the Western North Pacific region. The volcanic islands of Chuuk are an anomaly in the Pacific because they are encircled by a reef but have not yet subsided beneath sea level to become a classic atoll. Chuuk State comprises approximately 85 sand and coral islets (Encyclopaedia Britannica).

The capital of Chuuk state is Weno, located on Weno Island which is part of Chuuk Lagoon, a large archipelago with mountainous islands surrounded by a string of islets on a barrier reef (Figure 3). Weno is the largest city in the FSM. Chuuk State is divided into several island groups: Chuuk Atoll, Nomwisofo, Hall Islands, Namonuito Atoll (Magur Islands) (northwest), Pattiw (Western Islands), Eastern Islands (Upper Mortlock Islands) and Mortlock Islands.

Chuuk State is composed of large lagoon, a large archipelago with mountainous islands surrounded by a string of islets on a barrier reef, and islands which are flat and small located outside the lagoon called 'Outer islands'. The state is divided geographically into 5 regions: Northern Namoneas, Southern Namoneas, Faichuk, Mortlocks and Northwest islands. Although it is most populated state, Chuuk State has a total land area of 49.2 square miles not including the vast ocean area separating the group of islands in Chuuk State which lagoon alone is 36 square miles. Its geographical feature is very unique compare to other states which have very large central islands where majority of their populace reside.

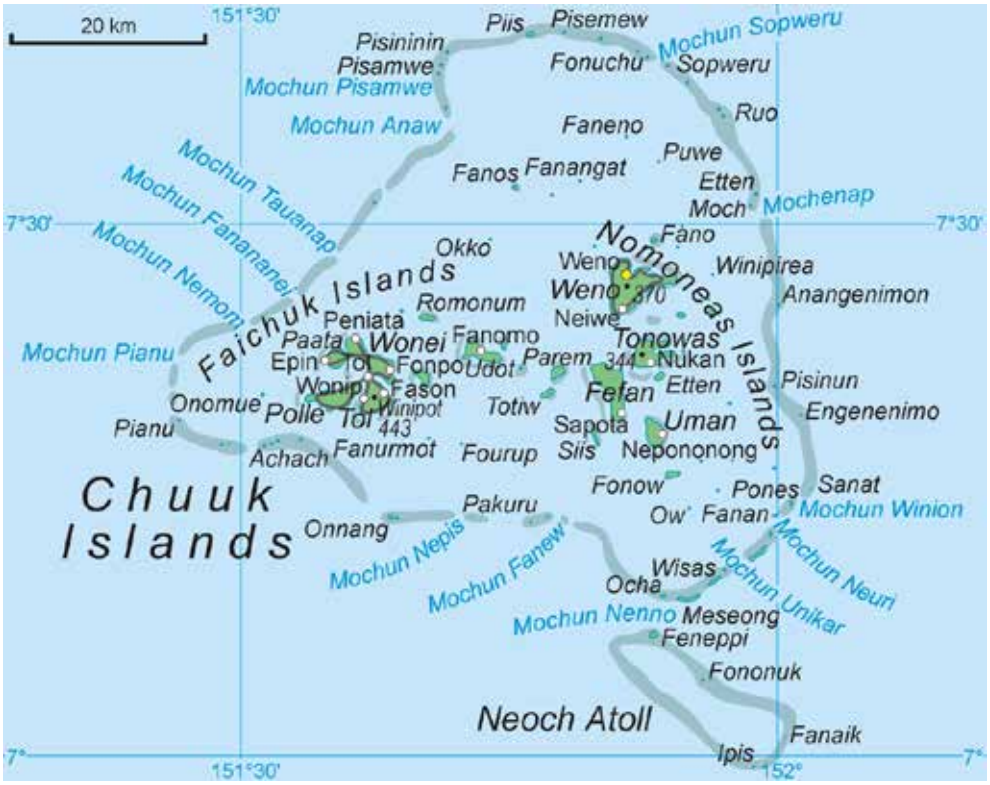


Figure 2: Chuuk State map
(source: Wikimedia Commons)

Figure 3: Weno island
(source: Wikimedia Commons)

1.2 POPULATION AND CULTURE

The total population of the FSM is approximately 102,843, and is predominantly Micronesian. The 2010 census indicated a decline in population due to outward migration and declining fertility. Chuuk State has the highest population as well as the highest proportion of households with immediate family members living abroad (43.5 percent) mainly in Guam and Hawaii but also in mainland USA. English is the official language of FSM, however eight indigenous languages are spoken in FSM.

Each of FSM's states, being separated by large expanses of water, has maintained their own distinct culture, traditions, customs and languages. However, some centuries-old economic and cultural bonds between the states exist.

The population of Chuuk State is 48,654 (approx. 47% of FSM's total population). The main population centre of Chuuk State is the Chuuk Lagoon which has a population of 36,158 and includes FSM's largest city, Weno which has 12,000 people (2010 Census). Chuuk has a population density of 993 per square mile (383 per square kilometre), which is the highest density compared to other states. Chuuk also has a younger population on average than the other FSM states.

The Pattiw Region of Chuuk State is of particular cultural interest in that it contains some of the most traditional islands in the Pacific which are culturally related to the outer islands of Yap (Fletcher and Richmond 2010).

The people of Chuuk are rich in culture and tradition. Many of its old ways are still seen in many parts of the state. It is a matrilineal society. Land and clan title are handed down on the woman's side. Chuuk is the only state with both 'Soufonu' and 'Sounono', Soufonu are those who own the land and Sounono are those who owns the reefs and shores.

Food: Great part of Chuuk State still rely heavily on subsistence base living. Food grown on land and in the ocean are still big part of their source of food. Kon, a pounded breadfruit able to be eaten for a week long is a popular source of starch for many Chuukese. Other preservation method of food such as Epot, fermented breadfruit can be stored for months and prepared for consumption

Clothes: Grass skirts are no longer attire used by Chuukese today. Some outer islands still follow old tradition of topless and lava lava. Chuuk also adopted a dress through missionaries influence called the 'Nikoudang'. It is similar to the Hawaiian Mumu but bulkier to lessen the accentuation of female figure.

Language: Chuukese is the native language. English is second language for some perpetuated by Western influence and adopted by FSM as their national language. Each state has its own dialect making communication very different. In Chuuk, majority of the region have similarity in their dialect allowing easier communication although accents and pronunciation can sometimes be barriers.

Arts and Crafts: Many of the crafts in Chuukese culture can been seen in their handicrafts. The two most common ones are the Tepanus and Founun. The Tepanu otherwise Devil Mask is only seen in Chuukese artifacts. It was used during rituals to drive away bad spirits in villages. Founu commonly known as love stick is a hand crafted wood made in pair as a form of dating ritual for Chuukese in the old days.

Knowledge and Tools: Among the many tools and artifacts used in old ways by Chuukese the most common one is the traditional sailing canoe. This canoe is sailed by traditional Navigators who uses no modern instrument to get around the islands. The Northwest islands in Chuuk are renowned for the skill in traditional navigation. Adopted knowledge by Hawaiians and other areas in the Pacific have revived their knowledge of art through this great school of navigation in Chuuk on the islands of Pattiw.

Religion: Although all of Chuukese are mainly Christians (50% Catholics and 50% Protestants), there is still practice of the old ways. Chuukese in the past worshipped deities for various rituals. This no longer a common practice in communities but the use of local medicines still practices. Few churches in Chuuk frown upon because of ritual practices which carry certain symbolisms and believes.

1.3 ECONOMY

In 2011, FSM's GDP was USD$310 million. Annual growth was at -3.2% while inflation was at 2.8%. Around 70% of households across FSM have an annual income below USD$15,000, and the unemployment rate across FSM is at 22%. The ratio of debt to nominal GDP rose to about 30 percent in FY2009, but decreased slightly to 28% in the following two years. According to the 2010 census, unemployment for Chuuk state was approx. 24.6 %; 31.8 % in Chuuk Lagoon and 12 % in the outer islands.

In FY2007 both Chuuk and Kosrae were required to implement a sizeable Reduction-In-Force (RIF), amongst other fiscal measures, to restore fiscal balance as the capacity building sector grant (Compact) was phased out from non-conforming purposes. This led to job loss due to reduction in the size of the public sector; In Chuuk the compression was 28% and 317 public service positions were eliminated. While the year was a positive one for fisheries, the economy contracted by 2.1%. In FY2008 with the RIF ongoing, the negative shock of the world recession had a strong impact on the state economies. Higher fuel and food prices eroded real incomes and GDP fell by a further 2.6%. After several years of fiscal consolidation, FY2010 saw a return to growth in public administration and the economy expanded by 2.5% overall. These trends continued to exert themselves in FY2011 although good performance in fisheries replaced public administration as a source of growth, and the economy grew by 2.1% (ADB 2012).

According to the Asian Development Bank (2012) there is a need for greater citizens' participation in the development of the FSM. There is potential for a greater contribution by youth and women particularly in the growth of small-scale private enterprise. There is considerably more room for civil society to play an active role as a development partner alongside international donors and government agencies, but also, particularly at the community level.

While the size of the labor force remains relatively the same between 2000 and 2010, the number of people who are employed has moderately increased. One of the main contributing factors to this positive improvement in employment is increasing participation in the informal sector (subsistence). 11 percent of the population received cash remittances from overseas in 2010. 94.6 percent of households are engaged in agricultural activities, 81.8 in livestock raising activities 71 percent in fishing activities. 10 percent of households reported to be engaged in these activities for sale or marketing for cash (2010 Census.)

According to the Asian Development Bank (2012) in the early 1990s, in an attempt to develop the economy, the FSM embarked upon a strategy of substantial public sector investment in fisheries facilities and enterprises. However, these fisheries enterprises were not profitable, and over time the surviving entities were transferred to private ownership or management. There were signs of large-scale renewed interest in foreign investment in the fishing industry, but these have not materialized. Tourism, clearly a sector with comparative advantage for the FSM, has not fulfilled its potential, and sector GDP has declined by an annual average of 3.3% during the amended Compact.

The failure of the private sector to become the engine of growth has resulted in households falling back on their own resources and devoting increase efforts to subsistence production. However, FY2010 and FY2011 have been good years for private sector job creation as renewed construction activity has added 802 jobs since FY2008 (ADB 2010).

The incidence of families with incomes below the poverty line in FSM is among the highest in the Pacific region, as is inequality of income. Approximately 10% of people in FSM are below the Food Poverty Line. At time of writing this report, no data was available on poverty rates in Chuuk State.

FSM runs a large trade deficit, with imports being around ten times larger than exports. Food and fuel represent a significant proportion of this – comprising 46.6% of total imports to FSM in 2007. FSM is highly – and increasingly – dependent on these food imports, and total food imports showed a steep increase from USD$17 million to USD$43.6 million in the nine years to 2009 (FSM Agriculture Policy). Rising global food and oil prices means the costs of imports will continue to rise, and will have serious implications for FSM's terms of trade.

The vast majority of FSM's exports are tuna fish, as FSM has one of the largest tuna fisheries in the Pacific. Agricultural exports from FSM include betel nuts and kava.

National and state level governments in FSM employ over half of the country's workers. Government services and public enterprises account for 38% of GDP.

The FSM public sector is highly dependent upon development funding. USAID and Compact funding provides about 65% of revenue for national government and 75% of revenues for the states. However, levels of Compact assistance have been declining since 2004.

The 2004 Economic Summit in held in Palikir, Pohnpei resulted in agreement that FSM was at a critical point in its development. One recommendation was to embrace tourism as a means to address economic challenges associated with decreasing funding from the US (via the Compact of Free Association) and the desire for self-sufficiency. It was also agreed that such an approach would need to proceed with caution surrounding impacts to the environment, social, cultural and heritage resources.

Chuuk State Government operates on funds available to sector areas by compact funds and local revenue it generates.

- Taxations (sales tax, liquor and tobacco, wharfage, others)
- Fees/Licensing/permit (foreign investment, auto and driving, departure fees
- Donations (Grants, Foreign Aids)
- Loans (Short term Loans, Micro finance, Long term Loans

Whilst economic activity has continually declined along with Compact funding, the recent response following the Maysak Cyclone in 2015 has injected funds into the Chuuk State economy.

1.4 GOVERNANCE

FSM was administered by Spain, Germany, Japan and the USA before establishing a constitution in 1979 and achieving independence as an independent political entity comprising Yap, Chuuk, Kosrae and Pohnpei. It joined the United Nations in 1991.The FSM is a constitutional democracy in free association with the United States. The FSM entered into a Compact of Free Association with the United States in 1986 which placed responsibility for defense and external security with the United States as well as provision of financial assistance. The first funding period being 1986-2003 (worth USD$1 billion), and the second being 2004-2023 (worth USD$1.8 billion).

Under the 1979 constitution FSM has three levels of government: national, state, and municipal. The national congress is comprised of 14 representatives from the states, and the President and Vice President are elected from amongst the elected congressmen to lead the executive arm of the national government. The President then will appoint his Cabinet members from reputable and educated nationals of FSM. The national government exercised only certain powers expressly delegated to it by the constitution.The four state governments of Chuuk, Kosrae Pohnpei, and Yap are relatively autonomous.

Similar to the other states, Chuuk has its own executive and legislative bodies. FSM government established its states with high authority to run their own respective state matters autonomously. In fact most of the state governments in the FSM exceed the size of the National Government.
Executive Branch: A joint ticket of Governor and Lt. Governor gets elected by 50%+1 votes from Chuuk State registered voters. They are subject to two term, each term lasts for 4 years before another election. Recent restructuring of state departments have come down to four major department: Dept. of Administrative Services, Dept. of Health, Dept. of Education and Dept. of Transportation.

Legislative Branch: Chuuk State is the only state in the FSM that has a bicameral legislature (House of Senate & Representative). There are 10 Senate members, two of whom represent a region - five regions all together. The House of Representatives aka 'House' has 28 members. They are elected by their respective districts. There are 13 districts with number of representatives depends on population size. All together there are 28 members.

Judiciary Branch: the judiciary system is state court system with 5 seated State Justices including a State Chief Justices. Its appellate and state supreme courts are under same system but not inclusive of the municipal courts which are sometimes apparent in certain municipal governments.

Municipal governments: Chuuk State has 40 municipalities with their own municipal government. Each municipality has an elected mayor act as the executive side. Legislative side is with the municipal council. And lastly, a municipal court usually exists by one or two presiding judges.

Traditional Council: Each habitable island in Chuuk has a Traditional Leader known as "Soupun and or Makal' who comes from a clan that rules the island. These Soupun and or Makal are equivalent to Chief of an island. Chuuk State has a council of traditional leaders composed of 42 active members. This council is a strong hold of customs and traditions therefore are the decision makers of such matters
Chuuk State government is comprised of the following:

Executive Departments:
- Department of Administration Services:
  - o Budget
  - o Treasury
  - o Planning and statistics
  - o Public Broadcasting Corp
  - o Registrar of Corporations
- Department of Transportation:
  - o Public works
  - o Port Authority
- Department of Health Services
- Department of Public Safety
- Department of Agriculture
- Department of Education
- Department of Marine Resources

Executive Offices:
- Office of Governor (Administration)
  - a. ODA
  - b. Rural Development
- Office of Attorney General

Commissions
- Land Commission
- Election Commission
- Public Service Commission
- Chuuk Financial Control Commission
- Chuuk State Economic Policy Development Commission

Boards and Authorities
- Environmental Protection Agency (EPA)
- Chuuk State Health Care Plan
- Board of Education
- Scholarship Board
- Recreation Board
- Chuuk Visitor's Bureau
- Chuuk Housing Authority
- Chuuk Public Utility Corporation

1.5 RISK AND RESILIENCE CONTEXT

1.5.1 NATURAL VARIABILITY AND VULNERABILITY

Extreme events occur in FSM including droughts, typhoons, storm waves, flooding and landslides. El Nino events include low rainfall and droughts. El Nina events result in higher than average numbers of tropical storms (Aust Govt).

Chuuk is exposed to a range of threats that create significant vulnerabilities for the state. El Niño Southern Oscillation (ENSO) influences the region in formation of typhoon activity, the distribution of rainfall and the height of sea level in the western Pacific. Western states of Chuuk and Yap are impacted by the West Pacific Monsoon and resulting typhoon activity (although Yap is more affected than Chuuk). The most severe damage caused to Chuuk State occurred on 2 July 2002 when Tropical Storm Chataan struck the islands of Chuuk with 20 inches (~500 mm) of rainfall received in a 24-hour period. Of the 265 landslides attributed to the storm, at least 62 massive landslides occurred on 2 July, resulting in 43 deaths and hundreds of injuries on six islands. Sea level is also affected by ENSO, with El Niño periods leading to the lowering of the sea level (decreasing up to 1 foot, as in the case of the 1997 El Nino) and La Niña leading to the heightening of the sea level (in strong events raising up to 1 foot). Implications for this are significant, as the normal range between the daily high and low astronomical tides is around 4 feet.

Current climate observations for Chuuk State and FSM include (Climate Change in the Pacific: Scientific Assessment and New Research 2011):

- There is little variation in monthly maximum and minimum air temperatures between hottest and coolest months. This is impacted by sea-surface temperatures
- The wet season occurs between May and September
- The West Pacific Monsoon brings additional rainfall to the western FSM during the wet season
- Main extreme events that occur include droughts, typhoons, storm waves, flooding and landslides.

1.5.2 HUMAN-INDUCED VULNERABILITY AND RESILIENCE

Threats to Biodiversity

According to Chuuk State Biodiversity Strategy and Action Plan (September 2004), due to Chuuk's population density, its environment is facing a lot of threats. These threats range from conversion and degradation of habitat and ecosystems, invasive organisms and pests, to over-exploitation and unsustainable harvesting of resources.

Development impacts

Development practices, such as building in hazardous areas, can enhance levels of vulnerability and even worsen the impacts of coastal hazards. In Chuuk State key human-induced drivers of vulnerability include:

- Building and farming in areas which can cause mountain or coastal erosion
- Deforestation
- Removal of natural shoreline including rock and sands
- Poor sanitation and waste management

Socio-cultural resilience in Micronesia

Micronesians demonstrate significant socio-cultural resilience and resourcefulness through their culture and their understanding of the environment and weather upon which they have traditionally been dependent. Kinship and exchange networks between islands of varying vulnerability enable communities to deal with extreme events and natural disasters. In the past, mechanisms such as travel, migration and formal ceremonial exchange systems served communities well in dealing with extreme events. Today, the heritage practice of keeping 'exchange paths' active through kinship relations can be seen as a source of resilience and a strategy to cope with climate change (see Henry and Jeffrey, 2008).

Another traditional source of resilience in Micronesia is through food preservation for offsetting seasonal variations in food availability, to provide nourishment in times of disasters when crops are likely to be destroyed or damaged. As noted by Campbell (2006), such methods in Micronesia include:

- Fermentation of breadfruit in pits
- Creating pandanus and arrowroot flour
- Leaving yams in the ground.

Food production, especially on the outlying atolls, is vulnerable to climate change impacts such as sea level rise, storm surges and salt-water intrusion, which are already occurring. Like Pohnpei, migration from outer islands to more urban areas of Chuuk State has already begun and is increasing pressures on the resources.

1.5.3 RECENT DAMAGING EVENTS

Damaging or noteworthy weather events are found in Table 1.

Table 1: Recent known damaging events affecting Chuuk

DAMAGING EVENT	KNOWN IMPACTS
LANDSLIDES:	
Landslides from Tropical Storm Chataan (2002)	Of the 265 landslides attributed to the storm, at least 62 massive landslides occurred on 2 July, resulting in 43 deaths and hundreds of injuries on six islands in Chuuk.
TYPHOONS:	
Typhoon Maysak (March – April 2015)	Made landfall at Chuuk lagoon on Sunday 29 March and Ulithi Atoll, Yap, on 1 April. Contaminated water sources, damaged crops and infrastructure, killed five people, around 7,000 people homeless in Chuuk and Yap states.
Super Typhoon Haiyan (November 2013)	Labelled the biggest storm ever recorded, beginning as a cluster of thunderstorms in Pacific waters of the Federated States of Micronesia. It traversed Chuuk State but caused most damage in Yap and further Western Pacific Islands.
Tropical Storm Bopha (November 2012)	No major damage to Chuuk State reported.
Typhoon Lupit (November 2003)	Damaged or destroyed about 200 homes in Chuuk State with high waves flooding roads and homes, while high winds damaged crops.
Typhoon Pongsona (March 2003)	Brought tropical storm force winds to Chuuk. High waves from the storm washed over and covered some atolls. Destruction of houses and livestock on Hall Islands.
Tropical Storm Chataan (2002)	On 2 July 2002, Tropical Storm Chataan struck the islands of Chuuk with 20 inches (~500 mm) of rainfall received in 24-hour.
Supertyphoon Owen (November 1990)	Extensive damage to Hall Islands and Namonuito Atoll; nearly all houses and all food crops destroyed.
Typhoon Nina (November 1987)	Killed 5 and seriously injured 38; 40,000 homeless; $30-40 million in damages; winds 75 mph with gusts to 95 mph
Tropical Storm Abby (December 1979)	70 mph winds on Chuuk

Typhoon Pamela (May 1976)	Heavy damage to Satawan including a church steeple; 11" rain on Chuuk; 10 killed due to mudslides; massive damage to crops
Typhoon Amy (May 1971)	Wind 75 mph gusting to 110 mph; 1 death and many injuries; completely destroyed Namonuito Atoll; $4.5 million in damages plus $1 million in crop damage
HIGH TIDE EVENTS:	
Abnormally high tide (December 2008)	It is likely that the Chuuk and Yap outer islands experienced saltwater submergence nothing was reported by state authorities.
Typhoon Pongsona (March 2003)	High waves from the storm washed over and covered some atolls
DROUGHT:	
Drought – El Niño (January 2016 –ongoing)	Lower than normal rainfall during 2016. Below normal rainfall is expected across the region until later in the year.
Drought - El Niño (March - November 2007)	No information is available for this event (US government provided emergency assistance to Chuuk state government – July 2007).
Drought - El Niño (1997-1998)	El Nino weather phenomenon was causing record low rainfalls in many areas of the Pacific including Chuuk State. Severe impact on state's water supply system, crops and food security.
Drought – El Niño (1983)	Acute water shortage, destruction of crops, contamination of water, forest fire – throughout FSM.

Sources: FEMA, UNOCHA, Landers and Khosrowpanah, 2004

Figure 4: Damage from high sea surge, Lekinioch, Chuuk
Source: Pacific Climate Change Science Program partners 2011/

1.6 SECTOR AND POLICY CONTEXT

1.6.1 NATIONAL POLICY CONTEXT

Key national policies of relevance to disaster risk management and climate change are found in Table 2, with key policy goals and/or priority actions highlighted.

Table 2: FSM's national policies and key goals/priority actions

NATIONAL SECTOR POLICY FOR FSM	KEY POLICY GOALS/PRIORITY ACTIONS	
National Strategic Development Plan (2004-2023)	The National Strategic Development Plan has four main objectives: • *Stability and security* – to maintain economic assistance at levels that support macroeconomic stability; achievement of this objective requires levels of funding close to prevailing levels, to avoid the large periodic step downs in funding that were a characteristic of the first 14-year Compact funding package. • *Improved enabling environment for economic growth* – to be achieved through the FSM commitment to economic reform and the provision of an enabling environment to support open, outward-oriented and private sector-led development. • *Improved education and health status* – use of the annual Compact grant to support the provision of basic services in education and health. • *Assured self-reliance and sustainability* – to be achieved through establishment of a Trust Fund that would, after a period of time, replace the annually appropriated transfers from the US.	
Nation Wide Integrated Disaster Risk Management and Climate Change Policy (2013)	**Strategic outcomes:** • Economic resilience • Food, water and energy security • Infrastructure and settlements • Waste Management and Sanitation • Health and Social Protection • Education	**Strategic Objectives:** • Capacity Building and Public Awareness • Disaster Risk Management • Climate Change Adaptation • Greenhouse Gas Emissions Reduction • Enabling Environment
Agriculture Policy (2012)	• Achieve national food security, safety and nutritional health Improve farm incomes and livelihoods with particular focus on gender and vulnerable groups • Strengthen socio-cultural safety nets • Preserve and protect culture, traditional knowledge and practices • Support sustainable economic growth and improve the balance of trade • Improve natural resource management	

Energy Policy (2012) and State Energy Action Plans	**Vision:** To promote the sustainable social and economic development of FSM through the provision and utilisation of cost-effective, safe, reliable and sustainable energy services. **Goals:** • An effective, coordinated, resilient and dynamic joint states and national energy sector • A safe, reliable, cost-effective and sustainable energy supply • An efficient, attentive, responsive and competitive energy sector • A diversified energy resource base • The environmentally sound and efficient use of energy
Framework National Water And Sanitation Policy (2011)	**Vision:** To ensure that the people of the Federated States of Micronesia's right to secure access to safe and clean drinking water is met, and that the use of the Nation's freshwater resources is planned in a manner that maximises the benefits of this scarce and fragile resource for island communities, now and in the future. **Goals:** • To create an environment at the national level, in which collaboration and partnership in addressing water resource and wastewater management issues, between all stakeholders, and at all levels is fostered and encouraged; and • To enhance the mainstreaming of Integrated Water Resource Management and Water Use Efficiency Principles into National and State Development Planning.
Infrastructure Development Plan FY2004-FY2023 (2004)	• Electric Power: ensure that all areas of the country are provided with electric power in an efficient and effective • Water/Wastewater: Meet the demand for water supply and wastewater infrastructure in an effective and efficient manner • Solid Waste Management: Meet the demand for solid waste infrastructure in an effective and efficient manner • Roads And Pedestrian Facilities: To provide the infrastructure to enable transportation facilities to be adequate in terms of condition, capacity, reliability and safety to enable market opportunities to be realised for all areas of the country, including labour market opportunities • Maritime Transportation: To provide the facilities necessary to enable market opportunities to be realised for all areas of the country, including labour market opportunities • Education: To ensure that the learning experience is enhanced and diversified. • Health: To construct modern and efficient hospital facilities to meet the health needs of the nation • Government Administrative Buildings: To construct modern and efficient facilities required for government personnel to effectively undertake their functions
National (and States) Biodiversity Strategy and Action Plan (2002)	Eleven strategic themes, each with strategy goals: • Ecosystem Management • Species Management • Genetic Resource Use • Agro biodiversity • Ecological Sustainable Industry Development • Biosecurity

	• Waste Management • Human Resources & Institutional Development • Resource Owners • Mainstreaming Biodiversity • Financial Resources
Information, Communication & Technology Policy (2012)	Vision: Secure, efficient and affordable ICT to achieve equitable communication for the People of FSM. Goals: • Achieve Accessible and Affordable Communications for All, • Strengthen ICT Human Resources and Increase Human Resource Development Opportunities through ICT • Improve Economic Growth and Sustainable Development through ICT • Utilize ICT for Good Governance and • Create an Enabling ICT Environment through Policy Reform and Improvements in Legal Frameworks
Multi-State Multi-Hazard Mitigation Plan (2005)	**National goals:** • Promote disaster resistant existing and future development • Increase public understanding and support for effective hazard mitigation • Build and support local capacity and commitment to become less vulnerable to hazards • Improve hazard mitigation coordination and communication with federal, state, and local governments • Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to all identified hazards
Five Year Environment Sector Plan (2008)	**Strategic goals:** • Mainstream environmental considerations, including climate change, into national policy and planning as well as in all economic development activities. • Improve/enhance human environment and pollution control • Reduce energy use and convert tot renewable energy sources/Minimise emissions of GHG • Enhance the benefits of sustainable use of the FSM's genetic resources and ensure benefits are fairly shared amongst stakeholders • Manage and protect the nation's natural environmental; protect, conserve and sustainably manage a full and functional representation of the FSM's marine, freshwater and terrestrial ecosystems • Improve environmental awareness and education and increase involvement in citizenry of FSM in conserving natural resources • Establish biosecurity (border control, quarantine) programs to effectively protect FSM's biodiversity from impacts of alien species • Create sustainable financial mechanisms for environmental and sustainable resource initiatives • Enhance and employ in-country technical capacity to support environmental programs

National Climate Change and Health Action Plan (2012)	**Key recommendations include:** • Review, discuss and consider implementation of the adaptation strategies • Emphasise importance of community engagement and involvement with Adaptation activities • Initial focus should be on diseases considered to be "high risk" with respect to climate change in FSM (vector-borne and water-borne illnesses and malnutrition/food security) • The FSM EpiNET team should mainstream climate change and health issues into their program activities, with the Environmental Health Coordinator acting as the key contact for climate change and health, with input from representatives from OEEM, R&D, WSO and other national agencies and Offices as needed *See National Climate Change and Health Action Plan for the Federated States of Micronesia for details.*

1.6.2 STATE SECTOR POLICY CONTEXT

Table 3 has specific policies and plans for Chuuk State of relevance to disaster risk management and climate change and describes the key goals and priorities for each policy.

Table 3: Chuuk state's sector policies and key goals/priority actions

STATE SECTOR POLICY FOR CHUUK	KEY POLICY GOALS/PRIORITY ACTIONS
Chuuk State Strategic Development Plan (forthcoming)	A Chuuk State Development Plan (SPD) is due for completion by October. Key topic areas for the plan are: Agriculture, Fisheries, Tourism, Education, Health, Environment, Gender, Youth, Senior and Disable, Private Sector, Energy, and Infrastructure. The SDP will be a key resource in setting future Chuuk State direction and priorities for all sectors. (A draft SDP was consulted in preparing this JSAP – see Section 4 for details)
Chuuk State Disaster Management Plan and Operation Procedures (December 2015)	The Disaster Management Emergency Plan outlines the roles and responsibilities for disaster management and response. Chuuk Disaster & Emergency Operation Centre (CDEOC) provides support and assistance to the State Emergency Committee which is the main coordinating focal point. The State Emergency Committee operates from the Emergency Operation Centre. Members of the State Emergency Committee include all cabinet members including: Governor, Attorney General, Chief of Staff, department directors, other state and private sector managers. The Governor is the Chairman of this Committee.
	Each sector is charged with developing emergency management Standard Operating Procedures which are reviewed by approved by the Chairman. Different emergency situations require different departments and agencies to notify the Chairman of the State Emergency Committee. In an emergency situation, Lead Response Agencies (LRA) and Support Response Agencies (SRA) are defined. The LRA submits a damage assessment report to the Governor who may establish a recovery program and management committee. There are four stages of development outlined in the Plan; mitigation, readiness, response and recovery. The threats/emergencies outlined in the plan include: tropical cyclone/typhoon; tsunami; maritime pollution; search and rescue; aircraft accident; epidemic; drought; and mudslide.

Chuuk International Airport Emergency Plan (undated)	This Plan is developed to provide a coordinated response to an emergency involving a B737 aircraft carrying 150 passengers or other aircraft. The airport manager coordinates all on-site activities until the Director of Transport arrives on the scene. Responsibilities are also outlined for the Attorney General; Medical Unit; Department of Public Safety; Department of Public Works; Department of Marine Resources; Sea Transportation Division; private boat owners. Threats outlined include; hijack, sabotage, pilferage or theft; bomb; fire; natural disaster (typhoon, high winds, heavy rains); civil disturbance; radiological incidents and nuclear attack.
Chuuk Environmental Protection Agency Emergency Action Plan (1999-2002)	This Plan is annexed to the Chuuk State Disaster Management Emergency Plan 1999-2002 and specifically addresses the threat of oil spill. It outlines responsibilities of vessels involved, the State Governor, Coast Guard and National Government. Monitoring is conducted by the EPA with departments of transportation and health services as well as police.
Chuuk State Biodiversity Strategy and Action Plan (September 2004)	The Chuuk State BSAP or implementation plan was developed over a series of community consultations and expert meetings since 2001. The Plan outlines a vision, that the people of Chuuk will live in a clean and beautiful environment where biodiversity is resourceful and preserved, and where traditional knowledge and practices plus other modern knowledge and practices are utilized for the sake of sustainable development. The goal of the Chuuk State BSAP is to strive for successful actions to conserve, protect, preserve, and sustain Chuuk State Biodiversity for the benefit of the people of Chuuk today and in the future. It also outlines 5 objectives: 1. By 2006 at least one environmental NGO (non governmental organization) will be established and operational. 2. By 2006 at least two environmental clubs will be fully established in the schools to promote awareness on biodiversity issues and active participation in conservation activities. 3.By 2007 (School year September 2006) a curriculum on biodiversity conservation will be produced and implemented in the private and public elementary schools. 4. By 2007 at least 3 communities will each designate surrounding marine areas to be protected. 5. By 2007 at least 2 communities will each designate surrounding terrestrial or land based areas to be protected. The Plan also outlines required management and control measures and corresponding legislation needed.
Chuuk State Strategic Plan for Education (2007-2012)	This Plan responds to the Pacific Regional Initiative for the Delivery of basic Education (PRIDE) Project. It is part of an evolving process of education reform planning for Chuuk State along with the Chuuk Education Reform Plan (2005) and the Navigating with Pride: Vision 2020 (2001. Comprehensive strategic plan for education). Plans have all met challenges in implementation. Ultimate responsibility for the implementation of this plan lies with the Chuuk State Department of Education. The Plan outlines 9 Priority Areas; accountability; certification and professional development; curriculum, instruction and assessment; community partnership and involvement; facilities, resources and support services; governing and financing education; special education; post-secondary, adult and continuing education; vocational/technical education.

Chuuk Public Utilities Cooperation (CPUC)	CPUC Typhoon Response Procedures (August 2013): The aim of these procedures is to detail the preparedness and response arrangements for CPUC during a typhoon threat. Key information includes relationship to the Chuuk State Disaster Management Plan; activation of a CPUC Command Post; issuing of typhoon alerts and typhoon warning; securing equipment, material, vehicles and facilities; power generation and operation; post impact – initial assessment; and recovery phase. CPUC Drought Response Procedures (July 2014): The aim of these procedures is to detail the preparedness' and response arrangements for CPUC during a drought period. Key information includes relationship to the Chuuk State Disaster Management Plan; communication; Weno Groundwater resources; ground water management processes for CPUC; mitigation actions; and other water supply options.

1.6.3 KEY SECTORS - BACKGROUND CONTEXT

Water resources and sanitation
18.2 percent of the population of Chuuk does not access adequate drinking water and 43.5 percent do not access adequate toilet facilities (2010 census – note that 'improved' includes flush toilet, water sealed and ventilated improved pit while 'not improved' are not ventilated improved pit, or any other form of toilet and not having a toilet).

The Weno central water system coming from the Pou River is the major water system in the state and provides a piped water service to 10,000 persons and most of the state's commercial and tourism enterprises. Most areas on Weno Island have access to a continuous water supply. The exception is the southern side of the island which is sparsely populated and not serviced by the public water supply system (ADB, 2008).
The traditional culture and lives of the island communities in FSM are centered around freshwater, and the wealth of knowledge and beliefs of the fragile systems is being seriously threatened by the polluting and overuse of these water resources. Traditional knowledge of the system becomes vital in knowing the limits of a system and modern management needs to utilize this knowledge in order to supply a safe a clean water supply. Protection of the watersheds has become a major priority issue that is yet to be addressed through a management plan (Johnston undated).

Agriculture and Fisheries
The Chuuk State Department of Agriculture is a department under the Department of Administrative Services. Key issues addressing the agriculture sector include: inadequate funding and resources; lack of infrastructure for projects communications and transportation; limited agriculture land for development of projects; agriculture is not of high priority by leaders or head of states; capacity level is not high in expertise level for R&D and other skill such as reporting; lack of interest and participation in Youth and Women in agriculture; lack of collaboration between in CSDOA and Private Sector for commercial farming potential; lack of policies and enforcement in sustainable land management and forest use (Chuuk Strategic Development Plan (forthcoming).

Key strategies within the forthcoming Chuuk State Strategic Development Plan include improvement of the livelihood of the people of Chuuk (food security or income generation opportunities) and "maintaining and mitigating terrestrial resources which are impacted by unprecedented or longer term disasters" (endemic plant diseases, natural disasters and climate change) (Chuuk Strategic Development Plan (forthcoming)).

Human health
The primary health challenges affecting FSM include obesity induced illness and increasing substance abuse amongst youth. FSM has been declared as a Public Health Emergency for Non-Communicable Diseases (70% of all deaths are due to NCDs).

Most of the divisions of the Chuuk Department of Health share some common challenges. One of the most posing challenges has been the distance between the islands and poor weather in Chuuk. These two natural challenges compounded with the lack of transportation to islands, near and far, have created a major setback for activity/service delivery to the communities. Not meeting up to one program's schedule to visit a community/island has created a loss of community confidence/trust in the program's ability to deliver on time the services they are to bring. This loss of trust leads to activity failure in the community because people don't come for the services when they are actually delivered.

The Chuuk State Department of Health Services (CSDHS) 6 divisions: Hospital & Management, Nursing, Dispensary, Public Health, Dentistry and Environmental Health and Sanitation (Chuuk Strategic Development Plan (forthcoming)).

Energy

According to the FSM Nation Energy Plan, Chuuk still have the lowest coverage of energy services among all four states. This mainly because of Chuuk's unique geographical feature. Unlike the other states where you have a much bigger center island and much small island outside; Chuuk has a center island but many similar size island scattered in the lagoon and smaller ones outside the lagoon. This make electrification coverage very difficult.

The Chuuk State Development Plan (forthcoming) defines problem and issues: widely spread so coverage can be immensely challenging; large portion of Chuuk lands are unregistered and not surveyed; low economic activities to sustain energy services on most islands. Key solutions proposed in the SDP include: create partnerships with groups within the regions or on islands and work with municipal government to assist in land title clarification. Another key strategy is to promote renewable energy.

Education

State governments in FSM have responsibility for education, with the majority of funds coming from Compact of Free Association sources. All children in FSM are required by law to attend school through to eighth grade, and many continue to college after graduating high school. As a result, FSM has a high literacy rate. All students learn English as it is the official language of FSM. The National Infrastructure Development Plan earmarked USD$135.4 million for education infrastructure spending across the 20 years between 2004 and 2023. The Plan describes issues relating to education infrastructure including poor maintenance (including failure of water and power supplies); a number of schools in a highly deteriorated state; a shortage of supplies includes furniture, equipment, books and tools; a lack of diverse facilities (such as music rooms, auditoriums, vocational training facilities); inadequately qualified teachers; inappropriate school curricula; and a lack of vocational training.

Grants and US education programs are used to support many FSM students to attend the College of Micronesia (COM), the University of Guam and US colleges.

Children in elementary school age groups in Yap, Pohnpei and Chuuk entered elementary school at later ages or had been repeating the same grades as shown by the gross enrolment rates reported in the 2010 Census. Those with higher levels of education may have been migrating out of FSM during the decade since 2000.

Key issues affecting education outcomes in Chuuk as described within the forthcoming Chuuk State Strategic Development Plan include: high number of dropouts in K-12 system; high school graduates not entering/completing postsecondary institution or skill enhancement programs; and decreasing number of students entering CTE programs/trainings. These issues are planned to be addressed through the Chuuk State Strategic Development Plan with a focus on critical areas of: teaching and learning; accountability; organization and management; professional development; financing education; physical facilities and learning environment; community involvement and ownership and workforce training.

Transport, infrastructure and solid waste management

Roads and pedestrian facilities are a key priority sector for expenditure under the Infrastructure Development Plan, with USD$120.9 million earmarked for spending in the sector in the 20 years to 2023. An additional USD$88.5 million investment for maritime transportation and USD$68.4 million for air transportation has also been planned.

Most residents of the main islands of FSM own vehicles, making roads a crucial infrastructure sector. Poor transportation was identified in the FSM Agriculture Strategic Action Plan as a key limiting issue for agriculture, resulting in limited market opportunities for farmers in FSM.

Chuuk Department of Transportation is responsible for 3 main areas: Chuuk International Airport; Chuuk Commercial Port and Chuuk Public Works (Road and Solid Waste Management). Key issues affecting this sector include lack of sea transport to scattered island both in and outside of the lagoon, lack of road around Weno Island and poor sanitation services with solid waste management services only available on Weno Island.

Private sector and tourism

Foreign direct investment in the FSM is regulated by both the State and National Governments and as such, banking, insurance, international and interstate transportation, fishing in the Exclusive Economic Zone (EEZ), and exploitation of any resources (other than fishing) within the EEZ and in or beneath the sea-bed and the continental shelf beyond the territorial sea are regulated by the FSM Foreign Investment Act, which was amended by Public Law 14-32 of November 02, 2005, and foreign investment regulations of January 06, 2006. All the other sectors not regulated at the national level are under the jurisdiction of State Governments.

Export products from Chuuk State include: fisheries (tuna and reef fish), agriculture, cottage industries (clothing) and tourism (handicrafts and souvenirs). Private sector development is a topic of the forthcoming Chuuk State Strategic Development Plan and includes areas: product developments for export expansion; import substitution expansion for economic benefits; factors of production improvement in areas of land, labour and capital; direct Investment development through a marketable and friendly environment and infrastructures for private sector development are made and improved.

Majority of Chuuk's tourists are mainly been passionate scuba divers and there is potential to expand the tourist market. Key barriers to a strong tourist sector which the forthcoming Strategic Development Plan seek to address include: transportation barriers; low industry capacity; low quality products and services; inadequate infrastructure; lack of promotion; depreciating attractions; minimal level of investment by private sector and low support from public.

2. CLIMATE CHANGE IN CHUUK

2.1 CLIMATE CHANGE PROJECTIONS FOR CHUUK

2.1.1 OBSERVATIONS

It is important to distinguish between climate variability from climate change in the Pacific region as a whole. Although ENSO and IPO cycles make it difficult to predict future regional climate at time scales of decades to centuries, the value of global and regional climate models is that they can predict with substantial confidence how the long-term average climate will change as a result of natural and human-induced factors (The Pacific Islands Regional Climate Assessment, 2012).

Sea-level rise has occurred in the ocean surrounding FSM at a rate of 10mm per year since 1993. This rate is above the global average of 2.8-3.6mm/per year. The ocean has also become more acidic as a result of the ocean's absorption of carbon dioxide.
FSM climate sees little seasonal variation in temperature, with less than 1.5ºC between the average hottest and coolest months. FSM has experienced increases in annual and seasonal maximum and minimum temperatures since 1952, with temperature rising by around 0.1ºC per decade.

Warming trends are evident in Yap (and Chuuk), for both annual and seasonal air temperature since 1950, as seen in Figure 5. Chuuk's average rainfall is approximately 118 inches p.a. and trends for rainfall in Yap (and Chuuk) since 1950 are not statistically significant (Australian Government Bureau of Meteorology, 2011).

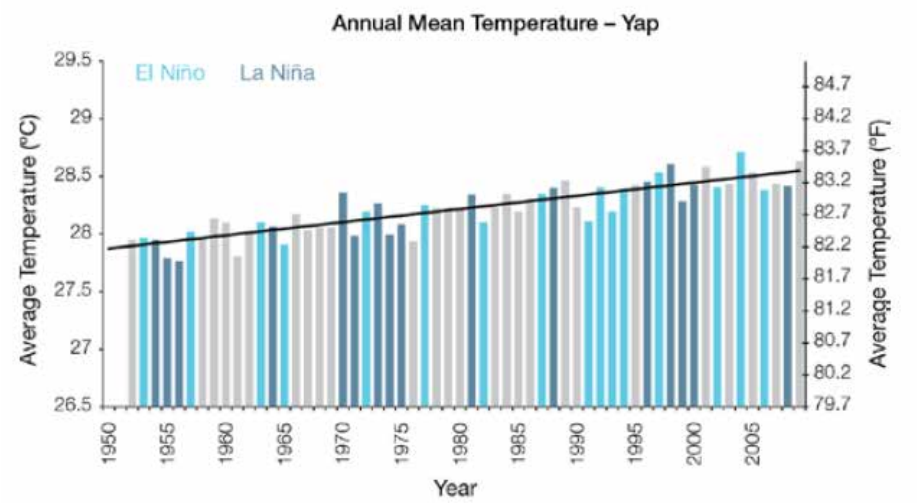


Figure 5: Annual mean air temperature in Yap (and Chuuk)
Light blue, dark blue and grey bars denote denote El Niño, La Niña and neutral years respectively. Source: Australian Government Bureau of Meteorology (2013).

High sea events have been observed in Chuuk and are often associated with La Nina events. Chuuk, with its higher June tidal maximum, has a higher likelihood of extreme water levels during this month than Pohnpei. Most occurrences of extreme sea-level events at both Pohnpei and Chuuk are primarily due to a combination extreme tides and La Niña conditions. This is seen in Figure 6 below, which also highlights specific high sea events which usually occur in La Nina years.

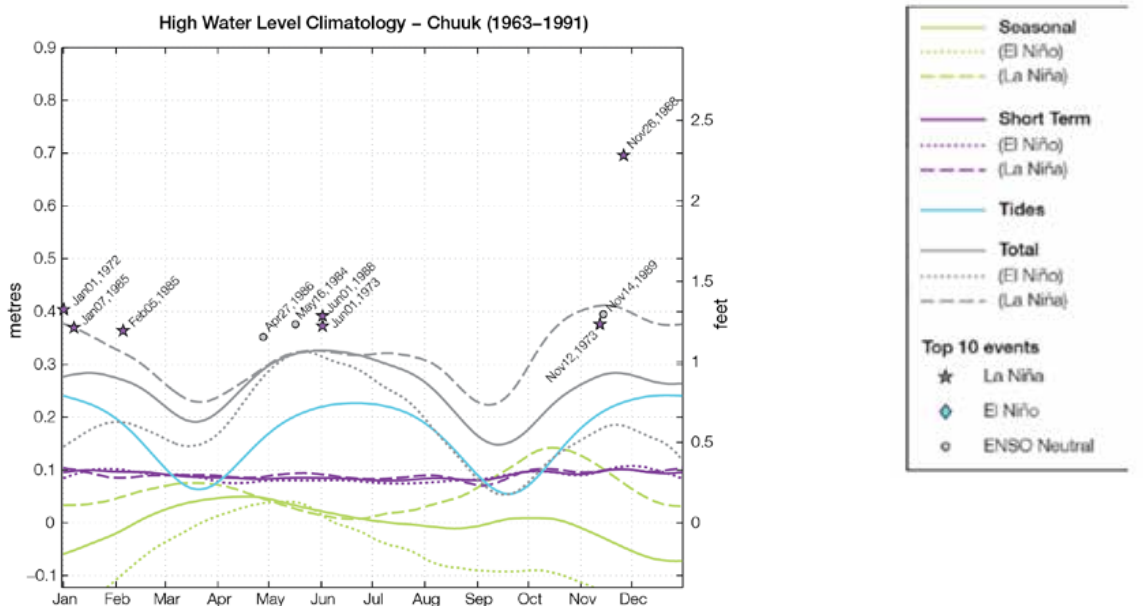


Figure 6: The annual cycle of high water levels relative to Mean Higher High Water (MHHW) due to tides, short-term fluctuations (most likely associated with storms) and seasonal variations for Chuuk
Source: Australian Government Bureau of Meteorology (2013).

2.1.2 FUTURE CLIMATE

The 5 main climate changes facing FSM include (Source: Australian Government Bureau of Meteorology 2011):

1. Temperatures have warmed and will continue to warm
2. Annual rainfall is expected to increase over the course of the century with more extreme rainfall days, more days of extreme heat and less droughts (some variation across FSM)
3. Projections for decreasing numbers and less intense categories of typhoons
4. Sea level has risen and will continue to rise
5. Ocean acidification has increased and will continue to increase and threaten coral reef species.

Temperature
Projections indicate that the air temperature and sea surface temperature will continue to increase into the future for the FSM and for Chuuk. An increase in hot days and a decrease in cool weather are also predicted. There is very high confidence in this prediction by the Australian Government Bureau of Meteorology (2013).

Rainfall and drought
Rainfall projections from global climate models carry some uncertainty, with inconsistent results more common than for temperature.

Despite this, almost all models predict an enhanced hydrological cycle, with increases in annual and seasonal rainfall and a reduced frequency of droughts. Rainfall patterns are also linked closely to ENSO cycles, however there is considerable uncertainty in how climate change will affect ENSO in the future.

Extreme rainfall days are likely to occur more often across the FSM despite the relatively steady recent trends observed.

The incidence of drought is also expected to decrease over the 21st century, consistent with an overall increase in rainfall for FSM.
Recent projections suggest that:

- mild drought will occur:
  - approximately eight to nine times every 20 years in 2030
  - approximately seven to eight times every 20 years by 2090 under the B1 (low) emissions scenario,

and six to seven times under the A1B (medium) and A2 (high) scenarios
- moderate drought will occur:
  - o once to twice every 20 years in 2030
  - o once every 20 years in 2090 for all emissions scenarios
- severe droughts will occur:
  - o approximately once every 20 years across all time periods and scenarios

Note that there is low confidence in these projections (see Australian Bureau of Meteorology, 2013 for details).

Severe weather

Projections for typhoon frequency and severity in FSM show a decrease in typhoon frequency by the last 21st Century as well as a decrease in the proportion of severe storms.

Sea-level rise

Sea level is expected to continue to rise across FSM consistent with current trends. Figure 7 shows projections for FSM up to 2070 for the low and high emission scenarios while Figure 8 shows observational data up to 2005 and projections to 2100.

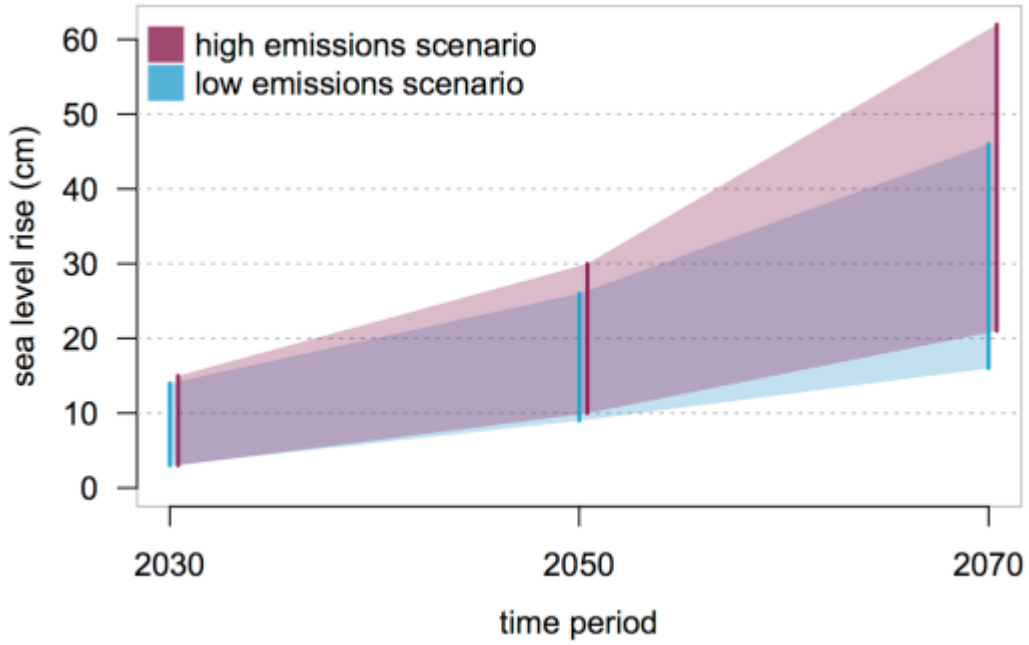


Figure 7: Sea-level rise projections for FSM under two emission scenarios and three time periods. Source: Australian Government Bureau of Meteorology (2011).

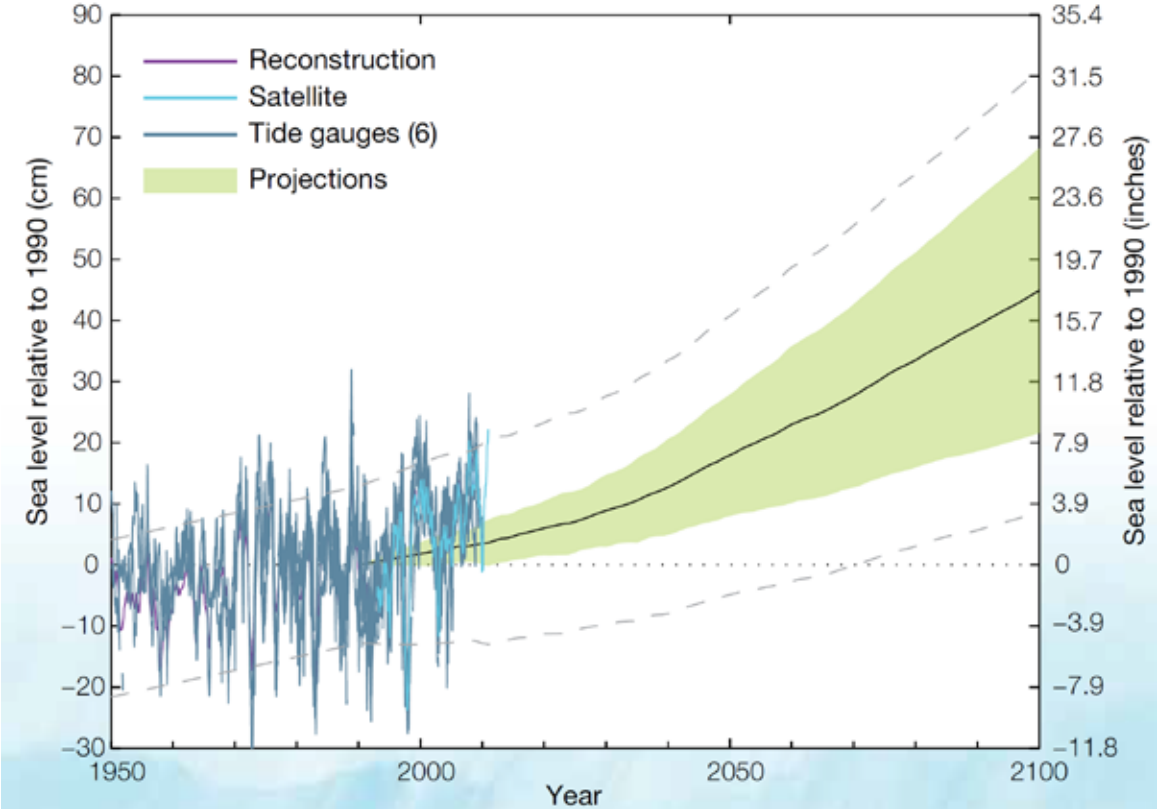


Figure 8: Observed and projected sea-level rise near Federated States of Micronesia.
Source: Australian Bureau of Meteorology (2011b)

Ocean acidification
Increased ocean acidity is predicted under all three emission scenarios for FSM. Reef ecosystem health is likely to be affected by such changes, with additional pressures such as coral bleaching and storm damage compounding the impacts.

2.2 FSM'S INSTITUTIONAL RESPONSE

2.2.1 DISASTER AND CLIMATE CHANGE POLICY CONTEXT

Actions to address risks associated with climate change and disasters have already been taken through the development of legislation, policies and plans in FSM and Chuuk State, and these are described below.
Nation Wide Integrated Disaster Risk Management and Climate Change Policy (2013) – superseding the Nation Wide Climate Change Policy of 2009

As noted in Section 1 (Governance Arrangements) and also due to the cross-cutting nature of disaster and climate risk management, implementation of the national policy for climate change and DRM is a shared responsibility between government, private sector, civil society and communities. The policy notes that national and state governments will lead the promotion, coordination and monitoring the implementation of the policy.

Due to the constitutional arrangements in FSM, the state governments are responsible for implementing the Disaster Risk Management and Climate Change Policy.

The Office of the Governor under the Disaster Assistance Act 1989 is specifically mentioned to be responsible for disaster mitigation, preparedness, response and recovery at the state level.

In Chuuk the State Disaster Coordinating Office provides support and assistance to the State Emergency Committee which is the main coordinating focal point for emergencies. The State Emergency Committee operates from the Emergency Operation Centre. Members of the State Emergency Committee include the Governor/Attorney General/Chief of Staff, department directors, other state and private sector managers. The Lieutenant Governor is the Chairman of this Committee.

Climate Change Act (2013)
The Climate Change Act introduces legal obligations for certain national government departments and agencies of FSM. The Act states that by 1 October, 2014 certain departments must prepare plans and policies on climate change (consistent with the National Wide Integrated Policy) and the Office of Environment and Emergency Management is responsible for overall implementation. Annual progress reporting of implementation of the policy is also stated under the Act.

Disaster Relief Assistance Act (1989)
This Act provides details of roles and responsibilities for times of disaster, including presidential authority, national government authority and state responsibilities. States are required to develop state disaster plans to qualify for national assistance. States wishing to request overseas support must first submit their request to the President. The Act also describes the Disaster Relief Fund, with contributing funds from the Congress of FSM, State legislatures, US grants and international organizations. Funds can be drawn upon after formal declaration of a disaster by the State Governor, and authorization by the President.

Disaster Mitigation Act (2000)
The Disaster Mitigation Act 2000 emphasises the importance of disaster mitigation and planning for disasters prior to their occurrence. The act reinforces a comprehensive and enhanced mitigation plan prior to disaster occurring.

The Chuuk State Constitution Section 12 (a) outlines the duties of the Governor in times of emergency, stating; If required to preserve public peace, health, or safety at a time of extreme emergency caused by civil disturbance, natural disaster, or immediate threat of war or insurrection, the Governor may declare a state of emergency and issue appropriate decrees. A decree may not involve the expenditure of unappropriated public funds unless approved by the Legislature.

2.2.2 DISASTER RISK MANAGEMENT AND CLIMATE CHANGE RESPONSIBILITIES

In 2008, USAID assumed responsibility for disaster assistance (response and reconstruction) to FSM from the US Federal Emergency Management Agency (FEMA). This change aims to reflect the transition of FSM to an independent country. As part of this shift in responsibilities, USAID contracted the International Organization for Migration (IOM) to manage disaster risk management coordination and implementation in FSM. This contract was renewed in 2014.

A Nationwide Climate Change Policy was adopted by FSM in 2009, and overseen by the Office of Environment and Emergency Management. The focus is to mitigate climate change – especially at the international level – and adaptation at the national, state and community levels to reduce the FSM's vulnerability to climate change impacts. In 2013, a Nationwide Integrated Disaster Risk Management and Climate Change Policy was put in place which, amongst other things, focuses on adaptation at the national, state and community levels to reduce FSM's vulnerability to climate change and disaster risks.

Governance of disaster risk management and climate change is delivered through the FSM Climate Change Country Team and the FSM National Disaster Committee. These structures are complemented by the divisions of Emergency Management and Environment and Sustainable Development in the Office of Environment and Emergency Management.

The FSM National Disaster Committee (NDC) is made up of Secretaries of the Departments, and Directors of offices and agencies that comprise Cabinet. This committee serves as an advisory body to the President on policy matters pertaining to the dispensing of the National Government disaster assistance to the state(s)

stricken by disaster. The NDC is responsible for guiding and supporting the development and implementation of disaster management programmes. A disaster risk management (DRM) 'network' exists amongst the Government of FSM and its main disaster risk reduction (DRR) partners.

Each FSM state has its own set of environmental laws and regulations geared to protect the islands form the effects of climate change. The Governor of each state has primary responsibility for the formulation of policies and procedures to deal with natural disasters and mitigation activities within their state. The Governor's Disaster Committee for each state includes all department, office and agency heads. The Committee serves as an advisory body to the Governor in the formulation of policies and coordination of the disaster response efforts.

In Chuuk the State Disaster Coordinating Office provides support and assistance to the State Emergency Committee which is the main coordinating focal point for emergencies. The State Emergency Committee operates from the Emergency Operation Centre. Members of the State Emergency Committee include the Governor/Attorney General/Chief of Staff, department directors, other state and private sector managers. The Lieutenant Governor is the Chairman of this Committee.

2.2.3 GAPS IN CHUUK'S INSTITUTIONAL RESPONSE TO DISASTERS AND CLIMATE CHANGE

As evidenced in Chuuk's State Disaster Management Emergency Plan, mention of dealing with the challenges associated with changing risks related to climate change are minimal.

There are a small number of strategy documents directly addressing climate change threats including 'Piis Paneu Vulnerability Assessment' (November 2010); 'Climate Change mainstreaming' (no not specified) and 'Guideline for Chuuk State: Targeted Interventions to Maximize Environmental Benefits' (date not specified). Overall, key gaps in the institutional response include:

- Maritime Conservation Area Management Plan (planned for 2019)
- Marine Protection legislation and network
- Legislation & enforcement on fish size catch limitation
- Coastal zone development plan and legislation
- Oil removal from underwater ship wrecks
- Amended Environmental Improvement Tax
- Legislation for protected terrestrial areas
- Legislation on watershed protection

2.3 GAPS AND FUTURE NEEDS IN CHUUK

The evaluation of FSM's progress towards the goals within the Hyogo Framework for Action (HFA), undertaken in 2012, provides a useful snapshot of how FSM is faring with regards to reducing risk across a range of issues. Table 4 consolidates some of these findings from the HFA Review as well as one relevant finding from the national Agriculture Policy, including prioritised actions that may be addressed in Chuuk's Joint State Action Plan for Climate Change and Disaster Risk Management.

Table 4: Areas for action to address current and future risk in Chuuk

AREA FOR IMPROVEMENT/ACTION	SOURCE OF INFORMATION
Community-level action needed: Greater focus on implementation of community level activities and need for a dedicated government budget to support activities at the community level. The need to provide communities with good examples of risk reduction activities; and adopt whole-of-community approaches where the population at large must assume responsibility for such change	HFA Review Process 2012

Increased awareness and understanding of CC and DRM: Improve understanding of DRR and climate change among government planners to enhance recognition of DRR and CC as a core government development function. Reinforce the integration of DRR and CC into development planning and reporting through regular formal reminders during the annual planning cycle. Strengthen accountability through improved community monitoring and participation; and climate change is viewed as having its origins in developed countries and the feeling was that developed countries should pay for the negative impacts on small island countries	HFA Review Process, 2012
Strengthen the governance capacity: Support for the under-resourced National and State Disaster Management Offices in terms of core operating budget, staff and equipment; and National and State Disaster Management Offices are under-resourced in terms of core operating budget, staff, and equipment; and no dedicated government budget for community-level DRM and CC activities	HFA Review Process 2012

Development and Infrastructure planning: Strengthen the integrity of the development consent process and environmental impact assessments; and the need to rigorously apply land use planning and actively enforce building codes	HFA Review Process 2012
Improved understanding of decision makers: Simplification and clarification of the concepts and terms used in the post-2015 regional and global DRR and climate change frameworks; and need for awareness raising on and dissemination of regional and global DRR and climate change frameworks at national level; and in a highly competitive environment, government planners do not see DRM and CC as a core government development function, preferring to rely on funding from development partners; and greater emphasis on how to achieve sectoral integration as DRR does not yet feature strongly in sectoral planning; and DRM and CC are exploited for political gain – politicians are quick to respond after a disaster, often with unrealistic promises of assistance	HFA Review Process 2012

2.4 LINKAGES TO NATIONAL, REGIONAL AND INTERNATIONAL POLICIES AND FRAMEWORKS

Chuuk's Joint State Action Plan for Climate Change and Disaster Risk Management represents the operational plan for action, which fits into the nested hierarchy of policy instruments to address climate and disaster risk from local to global level (Figure 9).

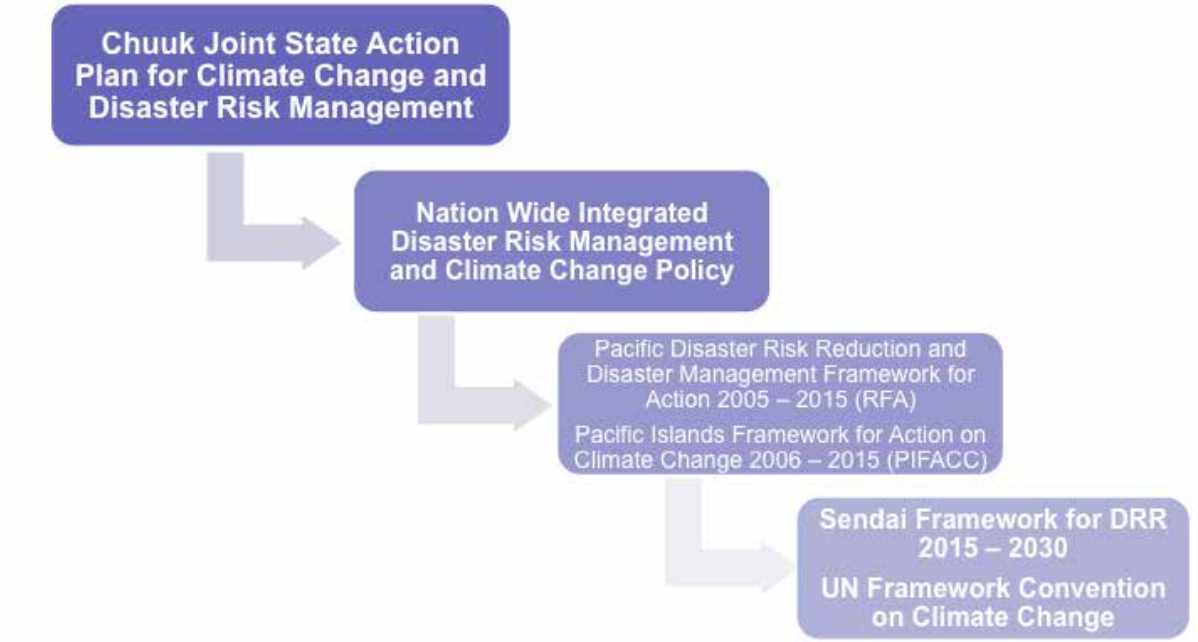


Figure 9: Links between Chuuk State JSAP and national, regional and global frameworks

At the regional level, work is being undertaken to integrate strategies for climate change and disasters through the Strategy for Climate and Disaster Resilient Development in the Pacific that will replace the RFA and PIFACC, post-2015. Chuuk's Joint State Action Plan will support this strategy through its integrated approach of addressing local disaster and climate change risks. As noted in FSM's National Wide Integrated Policy for Climate Change and Disaster Risk Management, instruments such as Chuuk's Joint State Action Plan will assist in meeting regional and international treaty obligations and objectives to which the Government of FSM has agreed.

3. APPROACHES TO RISK REDUCTION

3.1 CURRENT PROJECTS IN CHUUK STATE TO REDUCE RISK

Current projects relating to disaster risk management and climate change in Chuuk State include:

Chuuk Conservation Society:

- Coral reef monitoring (funded through Micronesia Challenge) for dedicated sites over the last 5 years and due to continue for two more years
- Climate change adaptation project (Onei Island) (funded through Micronesia Conversation Trust) partnership , EPA and Marine Resources (Chuuk State) working for the last 3-4 years to identify priority issues and plans for project implementation: coral reef protection; food security; water security; coastal management.
- Climate change adaptation project Piis Island (funded through Micronesia Conservation) includes a vulnerability assessment which has identified fisheries and sanitation as key areas.
- Forest Stewardship (funded by US Forest Services and partnering with the Chuuk State Department of Agriculture) and implemented in 3 islands of Chuuk (UFO) focused on long term management of trees stocks.

Past projects include a sea ecology project that initiated a marine protection area for Parem Island.

IOM:

- IOM has programs focused on preparedness, response and reconstruction -with a strong focus at present on preparedness and reconstruction (following Maysak Typoon in 2015). Key programs include:
  - Climate change adaptation and disaster risk reduction education (CADRE) which to date has focused on schools (10 schools to date) – including preparation of emergency plans, education materials (including comics). The program is supported by a steering committee made up of the Education Department, Chuuk Women's Council and Chuuk Conservation Society.
  - Rain water harvesting (NZ funded) which supported installation of rain harvesting and tanks at schools, churches and community centres as demonstration within communities. A next phase of this project may be supported through Australian Government funding.
  - Peace Corp are also supporting reconstruction efforts through training and support to households in home reconstruction

CDEOC:

- El Nino Joint Task Force (following the Chuuk State Declaration of Disaster Emergency (signed March 3 2016). The State declaration activated the Chuuk State Disaster Management Plan and responsibility of Lead Response Agencies. Activities have included: assessment; prioritising needs across municipalities; rehabilitation of springs and deep wells; provision of pipes, small repairs for community based solutions; provision of drinking water.

Red Cross:

- The Red Cross has a 'disaster preparedness and response policy', which includes activities related to: vulnerability reduction; building disaster response capacities; disaster relief and coordination. The Red Cross has a Strategic Plan 2015-2020, which includes disaster preparedness and response.

During the consultations to develop this JSAP, other activities were identified including private landowner efforts to address coastal erosion (sea wall construction, planting mangroves and pandana. Other activities included provision of water tanks to address food insecurity.

4. JSAP DEVELOPMENT PROCESS

4.1 THE JSAP PROCESS FOR CHUUK

The JSAP development process for Chuuk State was conducted in April 2016, with participation from all sectors. The process was coordinated and led locally by the Chuuk Disaster & Emergency Operation Centre (CDEOC).

The process started with orientation to key leads in State Government, Mayors and NGO sector and was followed with detailed consultations, validation workshop and refinement of JSAP actions and budget preparation. Key activities of the JSAP development process and participant numbers are listed below. As otherwise stated all participants were male.

Table 5: Participants of the JSAP development process

STAKEHOLDER GROUP	NUMBER OF PARTICIPANTS
Cabinet briefing on JSAP	13
Community leaders briefing on JSAP	32
Core team briefing – development of Terms of Reference for JSAP development	13
Consultation / workshop with Chuuk State Government representatives	20
Consultation / workshop with Municipal Mayors and Traditional Leaders	44
Consultation / workshop with CSO, women, youth, persons with disabilities and religious leaders'	20
(5 women)	
Consultation with Private Sector (Chuuk Chamber of Commerce)	6
(5 women, 1 male)	
Multi stakeholder workshop to JSAP findings and proposed actions	59
(5 women)	
Core team finalisation of sub actions	12

Whist gender representation in the consultations was not equal every effort was made to ensure women's participation and views were heard. Women are under represented in state government roles and Municipal government and therefore consultations with state government, Mayors and Traditional leaders was dominated by male participation. However women's participation in the NGO, civil society and private sector is comparatively higher in Chuuk and corresponded to relatively higher women's participation in these consultations. Women representatives from NGO and private sector were present for the multi stakeholder workshop.

A Core Team was established to be the reference group for the development of the JSAP especially in providing valuable departmental information that will assist in the identification of sub actions of the main actions being identified from the consultations and as well as the for the costing of all those sub actions.

The specific roles of the core team were identified and agreed by the Core Team members as follows:

- Provide Dept. information, Plans, Policies and or -Research, reports if any
- Identify disasters that have impacted Chuuk-Provide reports from respective departments
- Identify mitigation/adaptation measures
- Reports of past activities being implemented
- Participated in the prioritization of activities
- Review Chuuk disaster emergency plan
- Contribute to the costing of activities-availability
- Participate in editing of activity matrix
- Participate in the editing of JSAP
- Available at designated meeting dates and activities
- Review of JSAP implementation

The members of the Core Team were identified through a consultative process to ensure that they are willing, available and committed to support the development of the JSAP from the Chuuk State Government Departments and partners.

Figure 10: Photos from Chuuk JSAP consultations (April 2016)

Given the existence of the forthcoming Chuuk State Strategic Development Plan, proposed actions within the JSAP have been organised to align with the SDP topic areas. The JSAP can be seen as a complement to, and an action plan that 'climate and risk-proof' the SDP

Furthermore, links between the Chuuk JSAP Priority Areas, to the National Policy and Chuuk SDP, as seen in Table 6 below.

Table 6: Links between JSAP and National Policy

NATIONAL POLICY ON CC AND DRM STRATEGIC OUTCOMES	CHUUK STATE SDP	SECTOR FOCUS FOR CHUUK JSAP
Health	Health	**Health**
Education	Education	**Education**
Social & Cultural	Gender, Youth, Senior and Disable	
Resource, Development & Environment	Environment Agriculture Fisheries Tourism Energy	**Agriculture & Forestry**
		Environment
Infrastructure	Infrastructure	**Infrastructure**
Private Sector	Private Sector	**Private Sector**

Consultation with all groups consisted of a series of steps to ensure discussions were framed with the disaster and climate change lens, while at the same time considered in terms of sectors present, and actions already identified in their own sector plans. The steps taken consisted of the following:

Step 1) Identification of key hazards affecting Chuuk (identified from literature and from personal experience). Overall results from participants are seen in Figure 11, showing tropical storms and typhoons, coastal erosion followed by rising sea level rising were identified as the key hazard by stakeholders. It should be noted that representatives from outer islands identified sea level rising and erosion as the major issues, whilst representatives from the mainland identified a broader range of risks.

Step 2) Identified key strengths/capacity in communities and government (considering key hazards and climate change projections for Chuuk)

Step 3) Identified key vulnerabilities (considering key hazards and climate change projections for Chuuk)

Step 4) Ranking the five elements of capacity, given vulnerabilities and strengths. This step involved stakeholders using a matrix which included the five elements of capacity (human, social, natural, physical, financial – see also Appendix 3), and individually rating how they saw each element in Chuuk. Combined results for all stakeholders revealed where the strengths and gaps were for the development of actions (see next step, and results in Figure 12).

Step 5) Development of key actions to address gaps, and identification of responsible agencies to lead the action. This step was undertaken in two phases, firstly in small groups during group consultations, and secondly at the multi-stakeholder workshop Sub-actions were also identified to allow for estimated costs to be developed for each activity.

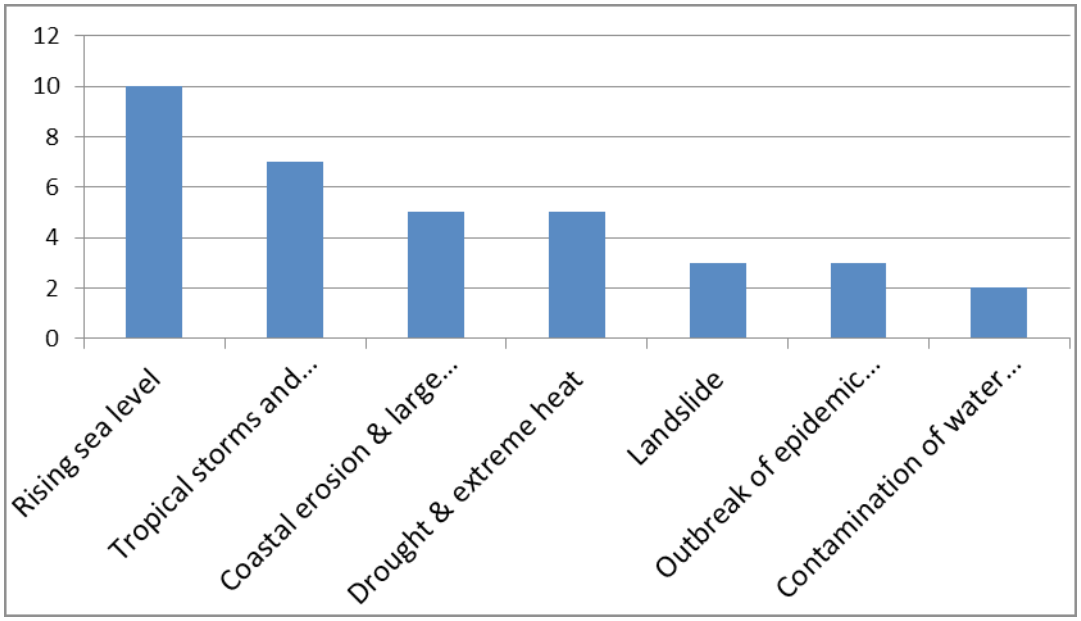
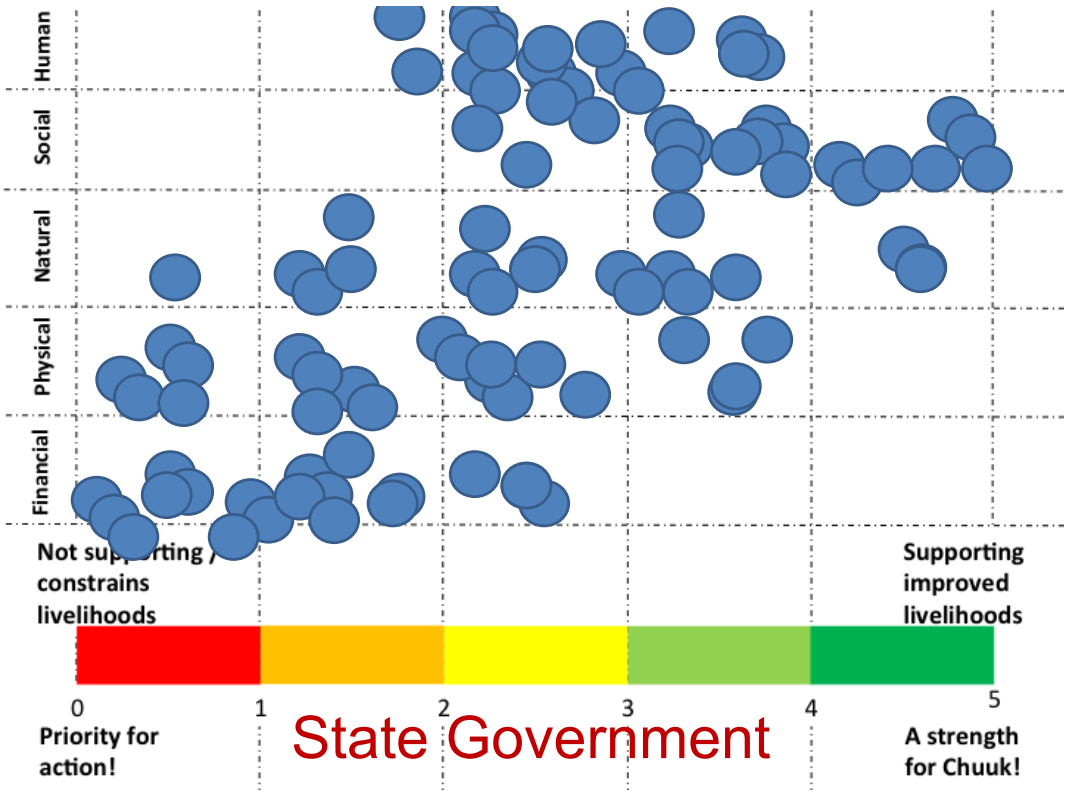
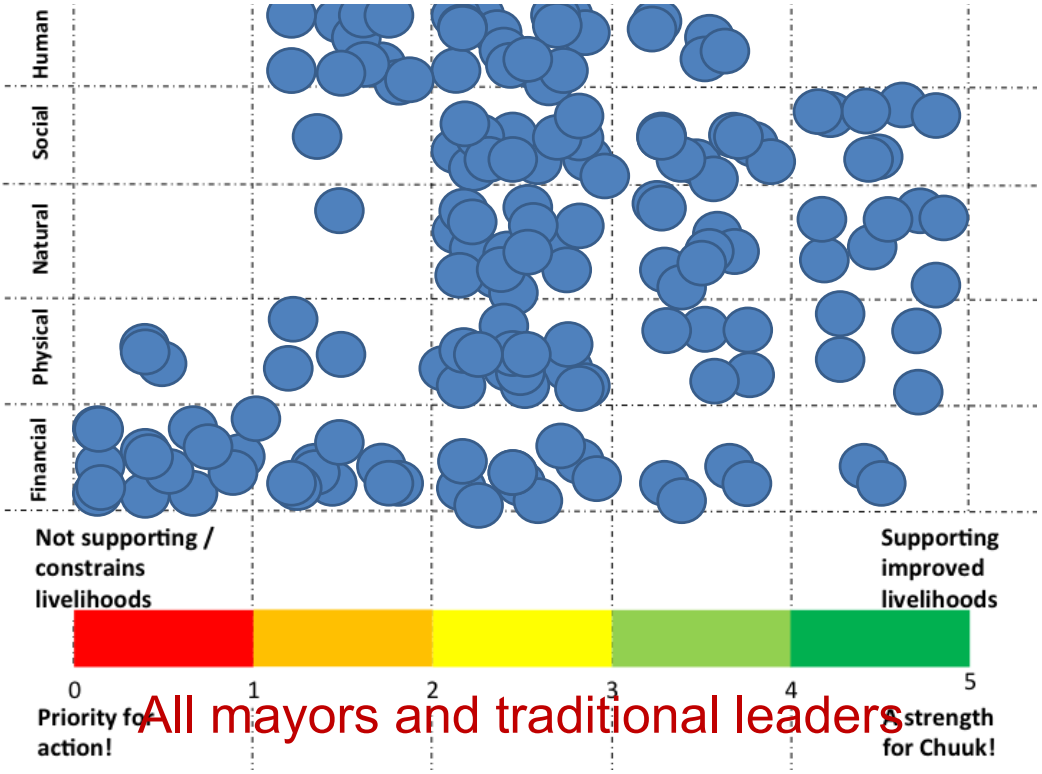


Figure 11: Key hazards identified from stakeholder consultations



State Government



All mayors and traditional leaders

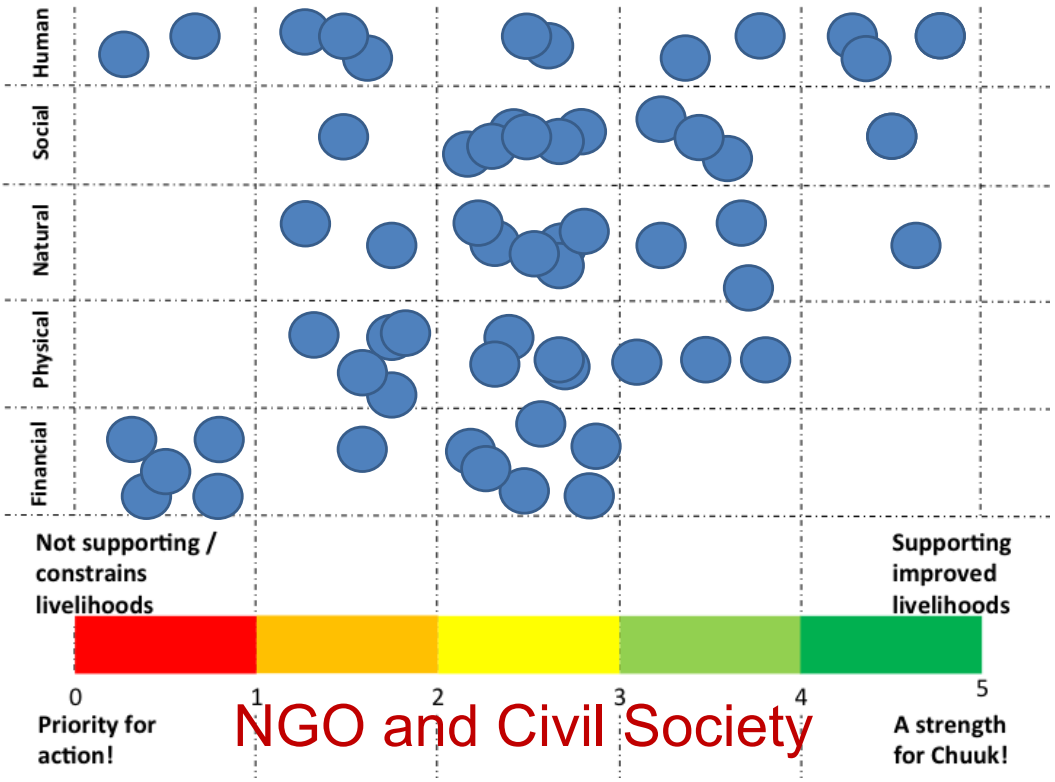


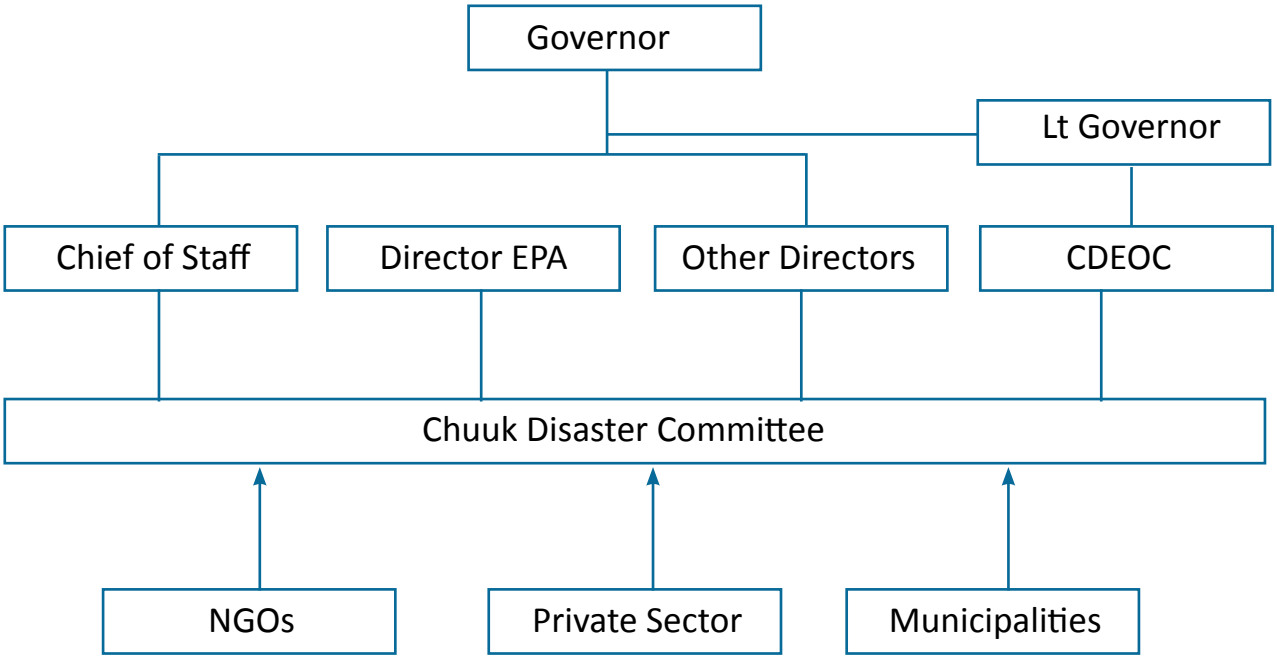
Figure 12: Results from consultations – rating of elements of capacity

4.2 STAKEHOLDER VOICES

Key issues were identified during consultations with stakeholders in Chuuk which are reflected in the Action Plan attached as Appendix D. Different experiences and priorities were identified by stakeholders depending on geography of islands (mountainous / atolls) which are reflected in the action plan. Impacts from both disaster and climate change were identified and a key theme noted across all stakeholders was risks in relation to sustained security of natural resources, including infrastructure, roads, water and energy and food. Employing local resources, existing knowledge, labour and social capital were identified as ways to respond to disaster and climate change hazards. Increasing community awareness, including risk assessment for disaster and climate change in all infrastructure planning and development and shoreline protection were key features of mitigating risk and strengthening preparedness for disaster and climate change.

5. INSTITUTIONAL ARRANGEMENTS

This JSAP will be provided to the Governors Office for endorsement and following other states in FSM will be a key resource to support Chuuk State in preparing to, and responding to disaster risk and climate change. The responsibility of the JSAP will reside with the CDEOC. The CDOEC will be responsible for implementation, monitoring and reporting on the JSAP. The CDEOC will draw on Chuuk State cabinet support for implementation and monitoring of the JSAP (Cabinet members are also members of the State Emergency Committee which is the strategic coordination committee for all Disaster Risk Management issues.



6. MONITORING AND EVALUATION

The monitoring and evaluation (M&E) of the JSAP is intended to achieve a number of objectives:

1. To provide for regular reports to the Chuuk State Government on the progress of JSAP implementation
2. To stimulate discussion and identify new initiatives that may evolve from the implementation of targeted actions
3. To provide a mechanism for feedback and acquittals to donor partners and organizations of the funds used and progress made in relation to JSAP implementation.

Key activities for monitoring and evaluation include:

- Reporting progress to key stakeholder groups (quarterly through direct engagement)
  - o Private sector:
    - Direct engagement to Chuuk Chamber of Commerce
    - Engagement through other agencies working with private sector
    - Engagement through Governors office
    - Public affairs (radio program)
  - o Mayors and Traditional Leaders:
    - Direct engagement through Municipal system
    - Engagement through other agencies working with Mayors and Traditional Leaders
    - Engagement through Governors office
    - Engagement through Church
    - Public affairs (radio program)
  - o NGOs and Civil Society:
    - Direct engagement to NGO sector
    - Engagement through other agencies working with NGOs
    - Engagement through Governors office
    - Public affairs (radio program)

- Quarterly review of JSAP by CDEOC and reporting to Governor; Chuuk State cabinet and OEEM
- Annual Platform Workshop for CDEOCs coordinated through OEEM: reporting on progress towards achieving JSAP actions at national forum, share lessons learned and recommendations for ongoing implementation of JSAP.
- The quarterly and annual review should document the achievements being made and also incorporate new and emerging issues that can build the resilience of the communities. A 4 year review of the JSAP activity matrix would enhance its relevance in the rapid changing environment that is now impacting Chuuk state.

7. ACTIVITY MATRIX

The detailed description of the activities for each of the sectors for the JSAP, along with action's, sub-actions and the lead and supporting agencies and costs, are found in Appendix D.

A summary of the key Priority Areas and key objectives is provided below, with the detail found below.

1. Infrastructure
Objective 1.1: Shoreline protection
Objective 1.2: Improve infrastructure in Chuuk State to withstand disaster risk and climate change
Objective 1.3: Infrastructure to support development / settlement in higher grounds

2. Agriculture and Forestry
Objective 2.1: Mangrove planting for shoreline protection
Objective 2.2: Mountain protection and rehabilitation
Objective 2.3 Strengthen fire response
Objective 2.4: Sustain productive agriculture

3. Private Sector
Objective 3.1: Strengthen Private Sector capacity to support disaster preparedness and response
Objective 3.2: Increase Private Sector awareness on disaster risk and climate change
Objective 3.3: Encourage disaster preparedness and environment friendly actions through tax incentives

4. Environment
Objective 4.1: Ensure water security for Chuuk
Objective 4.2: Improve waste management and promote environmentally friendly recycling

5. Health
Objective 5.1: Environmentally friendly sanitation coverage
Objective 5.2: Health security for Chuuk

6. Education
Objective 6.1: Skilled labour to support disaster and climate change preparedness and response

8. COSTING ESTIMATES

Costing estimates for activities are provided below. Costs include both financial and in-kind contributions for each of the six sectors.

Table 10: Cost estimates for Chuuk's JSAP

COSTING ESTIMATES		
Sector 1: Infrastructure		
Objective		Total Costs (Financial and In-kind)
1.1	Shoreline protection	$3,930,782
1.2	Improve infrastructure in Chuuk State to withstand disaster risk and climate change	$11,634,624
1.3	Infrastructure to support development / settlement in higher grounds	$10,133,182
1.4	Disaster preparedness strengthened in all communities	$2,889,095
1.5	Typhoon proof shelters in all communities	$2,811,710
1.6	Post disaster response strengthened with	$15,484,700
1.7	Settlement options for relocation of low lying island communities	$8,340,529
Sector 1: Infrastructure OVERALL TOTAL		**$55,224,622**
Sector 2: Agriculture and Fisheries		
2.1	Mangrove planting for shoreline protection	$344,130
2.2	Mountain protection and rehabilitation	$13,720,350
2.3	Strengthen fire response	$376,613
2.4	Sustain productive agriculture	$1.829,225
Sector 2: Agriculture and Fisheries OVERALL TOTAL		**$16,270,318**

Sector 3: Private Sector		
3.1	Encourage disaster preparedness and environment friendly actions through tax incentives	$42,049
3.2	Encourage disaster preparedness and environment friendly actions through tax incentives	$22,496
3.3	Encourage disaster preparedness through insurance schemes	$31,652
3.4	Private Sector Involvement in Disaster Risk and Climate Change Financing	$21,355
Sector 3: Private Sector OVERALL TOTAL		**$117,552**
Sector 4: Environment		
4.1	Ensure water security for Chuuk	$1,579,588
4.2	Improve waste management and promote environmentally friendly recycling	$971,411
4.3	Data Collection	$211,819
Sector 4: Environment OVERALL TOTAL		**$2,762,818**
Sector 5: Health		
5.1	Environmentally friendly sanitation coverage	$1,378,350
5.2	Health security for Chuuk	$3,678,920
Sector 5: Health OVERALL TOTAL		$5,057,270
Sector 6: Education		
6.1	Skilled labour to support disaster and climate change preparedness and response	$172,000
Sector 6: Education OVERALL TOTAL		**$172,000**
Total cost (financial and in-kind)		**$79,604,578**

A summary of breakdown of costs is provided in the Table below.

Table 11: Summary of breakdown of costs

SECTORS	TOTAL FINANCIAL	TOTAL IN KIND	OVERALL TOTAL
Infrastructure	4,118,632	1,105,990	5,224,622
Agriculture and Fisheries	15,866,745	403,573	16,270,318
Private Sector	109,760	7,792	117,552
Environment	2,242,540	520,277	2,762,817
Health	4,844,520	212,750	5,057,270
Education	138,400	33,600	172,000
OVERALL TOTAL	77,320,597	2,283,981	79,604,577
Percentage	97%	3%	

It is clear from the breakdown that the financial costs (97%) dominate the costs. Financial costs will be required from external partners to implement the priorities. The in kind costs (3%) is the contribution of the state and other supporting partners by way of staff time that will be supporting the implementation of the priorities.

The highest estimated cost of is in the infrastructure (70%), followed by Agriculture and Fisheries (20.5%), Health (6.3%), Environment (2.9%), Education (0.2%) and the least is Private Sector (0.1%) as presented in Figure 13 below.

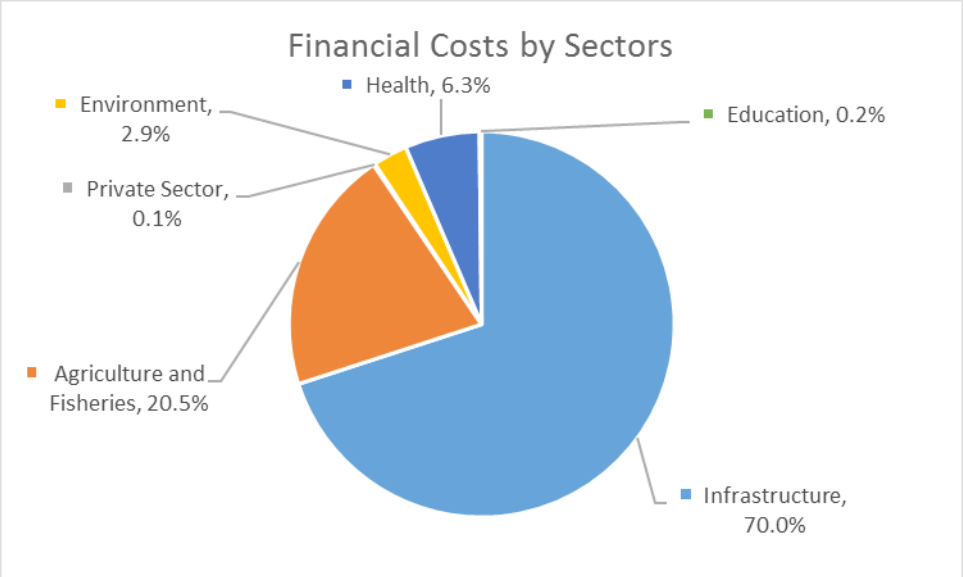


Figure 13 Distribution of costs by sector

9. APPENDICES

APPENDIX A: KEY DOCUMENTS CONSULTED

Australian Government Bureau of Meteorology (2011) *Current and future climate of the Federated States of Micronesia*. Australian Government, Canberra.

Australian Government Bureau of Meteorology (2013) *Climate Change in the Pacific: Scientific Assessment and New Research | Volume 2: Country Reports* - Chapter 4 Federated States of Micronesia. Australian Government, Canberra.

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APPENDIX B: DISASTER-RELATED ROLES AND RESPONSIBILITIES FOR CHUUK

Table 7: Disaster-related roles and responsibilities for Chuuk

ORGANISATION/ PERSON	ROLES AND RESPONSIBILITIES
Governor	• Declare a state of emergency if needed • Designation of a state CDEOC • Designation of a command post • Designation of shelters • Declaration of various states of warning • Mobilization of the emergency task forces and initiation of necessary property and life-saving measures, evacuations, mass care, etc • Initiation of damage assessment as soon as feasible when a disaster occurs and communication to the FSM President when national and/or US FEMA or other foreign assistance is needed • Designation of a disaster application center and a disaster field office
State CDEOC	• Maintaining and updating the State Preparedness Plan • Developing public awareness and training programs in cooperation with other State departments and agencies • Coordinating the State sponsored training and public awareness programs with appropriate department and agency heads • Preparation of requests for disaster or mitigation assistance to the National government, or through the National government to foreign governments or other international organizations or agencies • Ensuring that warnings are issued to the public when the Governor declares different warning stages • Performing all other emergency coordination functions that may be necessary given the demands of the given disaster or emergency situation
Emergency Operations Center/Command Post	• Provides a point of centralized control, coordination and direction of emergency operations • Serves as a place for key staff to effectively work together, share information and decision-making, and assists in making the most effective use of resources • Staff report to the command post after a disaster has occurred or when the Governor declares that a treat has been identified

Source: URS (2005).

APPENDIX C: ELEMENTS OF CAPACITY

Table 13 provides details on the 'elements of capacity', used by workshop participants to gauge strengths and weaknesses across Chhuk State.

Table 8: Elements of capacity

CAPACITY	DESCRIPTION
Human	Skills, health, knowledge, education, ability to labour, physical capability
Social	Networks, social claims, social relations, affiliations, associations, land tenure.
Natural	Natural resource stocks (fisheries, forests, coastal ecosystems, fresh water) & environmental services from which resource flows must be managed
Physical	Capital items that can include infrastructure, equipment and improvements in genetic resources (crops, livestock).
Financial	Capital base - cash, credit/debt, savings, Compact Funds, development partner projects, other economic assets

APPENDIX D: DETAILED COSTING OF ACTIONS AND SUB-ACTIONS

SECTOR 1 - INFRASTRUCTURE

ACTION	SUB ACTION	TOTAL IN-KIND	TOTAL
Objective 1.1: Shoreline protection			
1.1.1 Develop costal management plan	Information collection	410	8,610
	Draft Plan	410	3,160
	Endorse Plan	219	219
Sub total		1,038	11,988
1.1.2 Carry out assessment on needs for shoreline protection	Carry out vulnerability assessment	48,832	372,032
	Prioritise areas for immediate - short-medium-longer term action	8,139	27,139
	Identify context specific appropriate response including natural or man made	4,069	15,419
Sub total		61,040	414,590
1.1.3 Create community awareness about shoreline protection	Develop specific communication and awareness raising strategy for shoreline protection	819	4,569
	Ensure disability inclusiveness within awareness raising strategy	0	0
	Conduct community workshops	6,554	202,154
	Prepare and broadcast Radio talkback	6,554	10,554
	Produce brochures / flyers / comic books	23,054	542,694
	Reduce shoreline activities	0	0
Sub Total		36,983	759,973
1.1.4 Implement shoreline protection projects in high risk areas	Installation of community based shoreline protection and beach nourishment projects (as appropriate use of endemic species planting, wave breakers, man made channels, replanting coral) [soft and hard structure]	49,158	1,491,158
	Integrate traditional skills knowledge transfer, especially in use of skills / knowledge in construction of retaining walls	49,158	249,158
Sub Total		98,317	1,740,317
1.1.5 Education and awareness on coastal erosion and sea level rising	Improve existing tools for communication	3,569	15,419
	Traditional knowledge (mapping before and after)	0	0
	School and community outreach		
Sub Total		3,569	15,419

1.1.6 Establish shoreline protection regulations	Develop laws and ordinances to maintain natural shoreline protection	4,916	52,716
	Enforce regulations	0	0
	Consultation with resource owners	4,916	195,316
Sub Total		9,832	248,032
1.1.7 Monitor shoreline activity including coastal erosion	Conduct annual inspection / Assessment of coastal bench marks	19,663	740,463
Sub Total		19,663	740,463
TOTAL		230,442	3,930,782
Objective 1.2: Improve infrastructure in Chuuk State to withstand disaster risk and climate change			
1.2.1 Zoning laws in place to reduce risks of climate change and disaster risk	Community awareness on option of zoning laws	6,554	179,554
	Draft zoning laws	4,916	36,416
	Endorse zoning laws	819	1,319
Sub Total		12,290	217,290
1.2.2 Building codes in place and compliance assured	Community awareness on option of building codes	6,554	191,554
	Draft building code	4,916	36,416
	Endorse building code	819	1,819
Sub Total		12,290	229,790
1.2.3 Ensure infrastructure and design includes disaster risk and climate change consideration	Conduct risk assessment for existing and new infrastructure	24,416	108,666
	Prepare climate proof designs	4,916	36,416
	Retrofit highly vulnerable infrastructure	19,663	11,042,463
Sub Total		48,995	11,187,545
TOTAL		73,574	11,634,624
Objective 1.3: Infrastructure to support development / settlement in higher grounds			
1.3.1 Improve access to dwellable locations through expansion of roads and basic infrastructure	Assessment of new inland infrastructure	4,916	84,766
	Design of inland infrastructure	4,916	48,416
	Construction of inland infrastructure	0	10,000,000
Sub Total		9,832	10,133,182
TOTAL		9,832	10,133,182
Objective 1.4: Disaster preparedness strengthened in all communities			
1.4.1 Early warning system for disasters in place	Assessment of early warning systems	42,832	488,382
	Implement recommendations	19,663	1,051,616
Sub Total		62,495	1,539,998
1.4.2 Evacuation system for outer islands in place	Development of community evacuation plans	6,554	123,154
	Emergency equipment for community committees	0	400,000
	Simulation exercise to test plans	85,663	241,063
Sub Total		92,218	764,218

1.4.3 Disaster Plans prepared at all levels linked to State Disaster Plan	Review of State Disaster Plan	14,277	284,477
	Develop Municipal Gov Disaster Plans	19,663	239,063
	Develop School Evacuation Emergency Plans	1,639	61,339
Sub Total		35,579	584,879
TOTAL		190,292	2,889,095
Objective 1.5: Typhoon proof shelters in all communities			
1.5.1 Promote typhoon proof housing in communities	Identify type / structure	0	253,600
	Select most vulnerable communities	108,000	156,300
	Demonstration / installation	0	135,840
Sub Total		108,000	545,740
1.5.2 Improve caves and natural safe areas available	Assessment / identification of areas	0	253,650
	Design and implement	0	500,820
Sub Total		0	754,470
1.5.3 Building (underground) storm shelter especially on low-lying islands.	Assessment, design and implement	0	1,411,500
		0	100,000
Sub Total		0	1,511,500
TOTAL		108,000	2,811,710
Objective 1.6 Post disaster response strengthened with			
1.6.1 Improved collaboration and cooperation with all sectors	MOU established	0	32,130
	Logistics and management improved	0	31,880
Sub Total		0	64,010
1.6.2 Post disaster assessment organized and conducted in line with State standards	Develop, integrate, update and improve post disaster plans	6,000	122,220
Sub Total		6,000	122,220
1.6.3 Prepare medical dispensary for each community (including shelter and store)	Identify sites	36,000	2,150,515
	Conduct survey assessment	36,000	2,150,515
	Construct store	0	2,026,550
	Secure vendors and equip dispensary (supplies and drugs)	0	451,300
	Hand over to Municipal government	0	211,100
	Training for upkeep of dispensary	0	480,500
Sub Total		72,000	7,470,480
1.6.4 Facilitate disability access for safe shelters	Assess current shelters for disability access	38,100	2,221,280
	Incorporate into designs for disability access	38,100	2,220,530
	Build requirements (existing and new) to ensure access	51,100	3,386,180
Sub Total		127,300	7,827,990
TOTAL		205,300	15,484,700

Objective 1.7: Settlement options for relocation of low lying island communities			
1.7.1 Consider options and prepare plans as appropriate for resettlement	Assess risks to outer island communities	46,500	379,240
	Hold community consultations on identified risks and consider options	139,500	903,139
	Policy / laws passed by State government	350	49,400
	Secure sea/air transport for families, communities	38,325	2,040,525
	Secure land for resettlement on main island	38,325	2,040,525
Sub Total		263,000	5,412,829
1.7.2 In outer islands each build at least one high building	Research, design and build and or retrofit of suitable facility	25,550	2,927,700
Sub Total		25,550	2,927,700
TOTAL		288,550	8,340,529
OVERALL SECTOR TOTAL		1,105,990	55,224,622

SECTOR 2 - AGRICULTURE AND FISHERIES

ACTION	SUB ACTION	TOTAL IN-KIND	TOTAL
Objective 2.1: Mangrove planting for shoreline protection			
2.1.1 Carry out assessment on mangrove planting	Carry out assessment of vulnerabilities and opportunities for mangrove planting	4,980	153,620
	Prioritise areas for immediate - short-medium-longer term action	1,680	22,560
Sub Total		6,660	176,180
2.1.2 Create community awareness on mangrove planting	Produce brochures / flyers / comic books	700	36,350
	Disseminate brouchers	5,250	29,500
Sub Total		5,950	65,850
2.1.3 Conduct planting program (involve school children in activity)	Establish mangrove nursery in selected islands	700	39,900
	Collection and distribution of seedlings	13,300	62,500
	Integrate mangrove planting into existing school programs	700	9,000
Sub Total		14,000	71,500
2.1.4 Establish mangrove protection in regulations	Draft legislation	1,050	29,550
	Endorse legislation	0	1,050
Sub Total		1,050	30,600
TOTAL		27,660	344,130

Objective 2.2: Mountain protection and rehabilitation			
2.2.1 Ensure information is available on land slide risk and make accessible within State	Prepare soil matrix	30,000	192,250
	Identify sites at risk	10,500	13,350
	Print and disseminate hazard flow data (landslide and flood)	10,500	13,350
Sub total		51,000	218,950
2.2.2 Stabilize hills and mountains as necessary to reduce risk of land slide / soil erosion	Engineering design of preventative measures to reduce risk	35,250	69,750
	Community projects for stabilisation	15,750	5,062,250
	Government projects for stabilisation	15,750	5,114,450
Sub total		66,750	10,246,450
2.2.3 Plant trees to prevent soil erosion	Establish nursery for plants appropriate for hills / slopes	11,750	87,250
	Community led tree planting programs	21,000	65,000
Sub total		32,750	152,250
2.2.4 Prevent deforestation to reduce soil erosion and risk of land slide	Community awareness about cutting trees	63,000	127,550
Sub total		63,000	127,550
2.2.5 Improve drainage system to prevent soil erosion and land slides	Design and installation of proper drainage systems	1,750	31,200
Sub total		1,750	31,200
2.2.6 Zoning laws in place to protect people from risk of land slides	Community awareness on option of zoning laws	30,000	103,100
	Draft zoning laws	2,625	19,075
	Endorse zoning laws	175	675
Sub total		32,800	122,850
2.2.7 Resettlement activities	Conduct vulnerability assessments	30,000	296,100
	Government select displacement site	1,750	3,500
	Develop new sites at main island	10,500	2,521,500
Sub total		42,250	2,821,100
TOTAL		290,300	13,720,350

Objective 2.3 Strengthen fire response			
2.3.1 Secure fire truck to respond to environmental and house fires	Solicit support from partners	1,313	301,313
Sub Total		1,313	301,313
2.3.2 Education and awareness not to start fire (especially during drought)	Conduct community and school visits	5,250	47,400
	Distribute awareness materials	5,250	19,650
	Radio programs	5250	8250
Sub Total		15,750	75,300
TOTAL		17,063	376,613
Objective 2.4: Sustain productive agriculture			
2.4.1 Move farms to higher grounds	Conduct soil tests in higher lands	12,900	258,175
	advocate shifting of farm to higher lands	5,250	9,250
Sub Total		18,150	267,425
2.4.2 Elevate gardens on low islands	Introduce gardening and elevate for food security	16,800	351,000
Sub Total		16,800	351,000
2.4.3 Elevate taro beds / create artificial beds on atoll islands	Addressing food security by elevating and creating artificial beds	8,400	549,400
Sub Total		8,400	549,400
2.4.4 Increase access and use of salt resilient taro	Provide of planting materials to all islands	8,400	342,600
Sub Total		8,400	342,600
2.4.5 Increase coconut / banana farms	Encourage coconut replanting	8,400	177,400
	Encourage banana replanting	8,400	141,400
Sub Total		16,800	318,800
2.4.6 Re-vitalised coconut processing plant	conduct feasibility study	5,250	59,750
	Implement recommendations	7,050	2,015,050
Sub Total		12,300	2,074,800
TOTAL		80,850	3,904,025
OVERALL SECTOR TOTAL		415,873	18,345,118

SECTOR 3 – PRIVATE SECTOR

Action	Sub Action	Total in-kind	TOTAL
Objective 3.1: Strengthen Private Sector capacity to support disaster preparedness and response			
3.1.1 Increase private sector awareness of State Government Disaster Management Plan	Disseminate information	2,625	5,625
	Conduct workshops	3,188	15,438
	Participate in the Disaster Taskforce	-	-
Sub Total		$5,813	$21,063
3.1.2 Conduct regular meetings between Chamber of Commerce and Chuuk State government to relay concerns to government regarding disaster risk management and climate change	Meetings conducted regularly (quarterly)	88	638
		-	-
Sub Total		$88	$638
3.1.3 Strengthen representation of private sector (Chamber of Commerce) on Disaster Response team	develop TOR to strengthen roles and responsibilities	205	1,255
	MOU signed	-	-
Sub Total		$205	$1,255
3.1.4 Support businesses to prepare 'continuity business plans' in times of disasters	Special conditions on loan criteria to private sector for vulnerable communities	-	-
	transparency of bidding processes by Government	-	100
	Ensure instant access to funds	-	-
Sub Total		$-	$100
3.1.5 Prepare Inventory of Chuuk State private sector assets / equipment in order to mobilise at times of disaster	develop an asset register	-	-
	Assessment of assets	48	1,998
	purchase of needed equipment	-	-
Sub Total		$48	$1,998

3.1.6 Create awareness for private sector of climate change projections to support action now and long term planning	Disseminate information on disaster risk and climate change projections	123	2,423
	develop a tsunami warning evacuation plan (hotels)	123	14,573
Sub Total		$246	$16,996
TOTAL		$6,399	$42,049
Objective 3.2: Encourage disaster preparedness and environment friendly actions through tax incentives			
3.2.1 Develop tax incentives for investment on disaster preparedness	Assessment of priority areas for tax incentives	123	12,623
	Develop policy on tax incentives	123	9,873
	Obtain approval of tax incentive policies	-	-
Sub Total		$246	$22,496
TOTAL		$246	$22,496
Objective 3.3: Encourage disaster preparedness through insurance schemes			
3.3.1 Assess options for affordable insurances for private sector	explore disaster insurance options	123	18,983
	Formulate MOU with preferred insurance cover supplier	123	123
Sub Total		$246	$19,106
3.3.2 Consider tax incentives to promote private sector switch to green energy	Development of policy on waiver	123	12,423
	Endorsement of tax waiver	123	123
Sub Total		$246	$12,546
TOTAL		$492	$31,652
Objective 3.4 Private Sector Involvement in Disaster Risk and Climate Change Financing			
3.4.1 Increase access to climate change finance	participation in Climate Finance Talks/ Negotiations	410	9910
	Grant writing trainings funding	246	11446
Sub Total		655	21355
TOTAL		655	21355
OVERALL SECTOR TOTAL		$7,792	$117,552

SECTOR 4 – ENVIRONMENT

ACTION	SUB ACTION	TOTAL IN-KIND	TOTAL
Objective 4.1: Ensure water security for Chuuk			
4.1.1 Draft policy-legislation on water resources management and safe drinking water for outlying islands	Draft a Policy	27,000	56,668
	Endorse the Policy	0	100
		0	0
Sub Total		27,000	56,768
4.1.2 Conduct ground water assessments on outer islands	Identify vulnerable islands	0	415,034
	Identify firm to conduct assessment	0	0
	Map water resources (hydrological mapping)	0	256,534
Sub Total		0	671,568
4.1.3 Design and improve (climate proof) water resources (including catchment and ground water)	Construction of suitable designs / structures for outlying islands	122,017	321,017
	Enhanced and improved distribution of catchments to rural communities within the lagoon	122,017	122,137
		0	0
Sub Total		244,033	443,153
4.1.4 Education and awareness on water conversation to children and youth (traditional knowledge in assessing water naturally in the environment, climate change effects, water conversation especially in times of drought)	Production of educational materials	0	8,000
	Distribute to schools and NGOs	63,680	74,180
		0	0
Sub Total		63,680	82,180
4.1.5 Provision of water tanks in each (outer) islands	Assessment of needs	0	0
	Purchase tanks	0	0
	Deliver tanks	0	0
Sub Total		0	0
4.1.6 Install emergency water systems (e.g. reverse osmosis system) in low lying islands	identify islands through needs assessment	0	78,440
	procurement of these RO systems	0	182,000
	Delivery and Installation	54,000	65,480
Sub Total		54,000	325,920
4.1.7 Increase capacity of rainwater harvesting and storage - especially in outer islands	Assessment of needs	0	0
	Improvement of existing tanks and storage		
	Purchase tanks	0	0
	Deliver tanks	0	0

Sub Total		0	0
TOTAL		388,713	1,579,588
4.2.1 Improve waste management in all communities	Build Fukuoka Method small landfill for 5 high islands in the lagoon	87,710	665,410
	maintenance and rehabilitation of new and existing dumpsite	0	150,000
	Install community incinerator for 2 high islands	0	33,000
	conduct waste segregation and collection in communities	0	17,700
	Conduct school and community awareness programs	0	60,500
Sub Total		87,710	926,610
4.2.2 Support private sector to act with environmental responsibility (recycling and waste management)		0	0
	Strengthen/re-establish recycling facility	0	0
	Incentives program/privatize collection of waste/recycling	0	0
	Can deposit legislation drafted for private sector	0	37,200
	Legislation endorsed	0	7,601
Sub Total		0	44,801
Total		87,710	971,411
Objective 4.3: Data Collection			
4.3.1 Improve climate change and disaster risk data	setting up weather stations in selected islands for weather data	43,855	86,695
	develop spatial maps for all the islands	0	60,000
	centralize with proper equipment climate change and disaster risk database	0	55,000
	train personnel to manage data	0	10,124
Sub Total		43,855	211,819
Total		43,855	211,819
Overall Sector total		520,277	2,762,818

SECTOR 5 – HEALTH

ACTION	SUB ACTION	TOTAL IN-KIND	TOTAL
Objective 5.1: Environmentally friendly sanitation coverage			
5.1.1 Regulation in place for all households to have toilets	Draft legislation	3000	21650
	Endorse legislation	1750	10750
Sub Total		4750	32400
5.1.2 Install of eco friendly septic tanks	Design for outlying islands	0	3000
	Include option of compost toilet	66875	1106225
Sub Total		66875	1109225
5.1.3 Public awareness and outreach to improve water, sanitation and hygiene (in home and community) (E.g. water and sanitation hygiene, agriculture and animal husbandry)	Media activities	875	6475
	Community and school visits	69750	230250
Sub Total		70625	236725
TOTAL		142250	1378350
Objective 5.2: Health security for Chuuk			
5.2.1 Continue Programs on Health Education	Conduct ongoing health education in schools and communities	54000	717700
		0	0
		0	0
Sub Total		54000	717700
5.2.2 Provide medical supply and medicine	Allocate / solicit support	0	1016400
	Disaster relieve fund	0	1016400
		0	0
Sub Total		0	2032800
5.2.3 Healthy Diet/Encourage consumption, fruits and veg consumption	Training / workshops proper and appropriate ways of preparing food also encourage fruit or local	14750	55150
	Go local' fairs	0	700000
		0	0
Sub Total		14750	755150
5.2.4 Strengthened food regulation and enforcement	Random inspections	875	68225
	Monthly inspections	875	68225
	Stronger food safety compliance		
	Inspections at storage and stores	0	36820
Sub Total		1750	173270
TOTAL		70,500	3,678,920
OVERALL SECTOR TOTAL		212,750	5,057,270

SECTOR 6 – EDUCATION

ACTION	SUB ACTION	TOTAL IN-KIND	TOTAL
Objective 6.1: Skilled labour to support disaster and climate change preparedness and response			
6.1.1 Promote skilled labour to support disaster preparedness and environment programs	Include in school curriculum	16,800	90,000
	Implement School disaster	16,800	82,000
Sub Total		33,600	172,000
TOTAL		33,600	172,000
OVERALL SECTOR TOTAL		33,600	172,000