

**DATA COLLECTION SURVEY
ON
DISASTER MANAGEMENT
IN THE PACIFIC

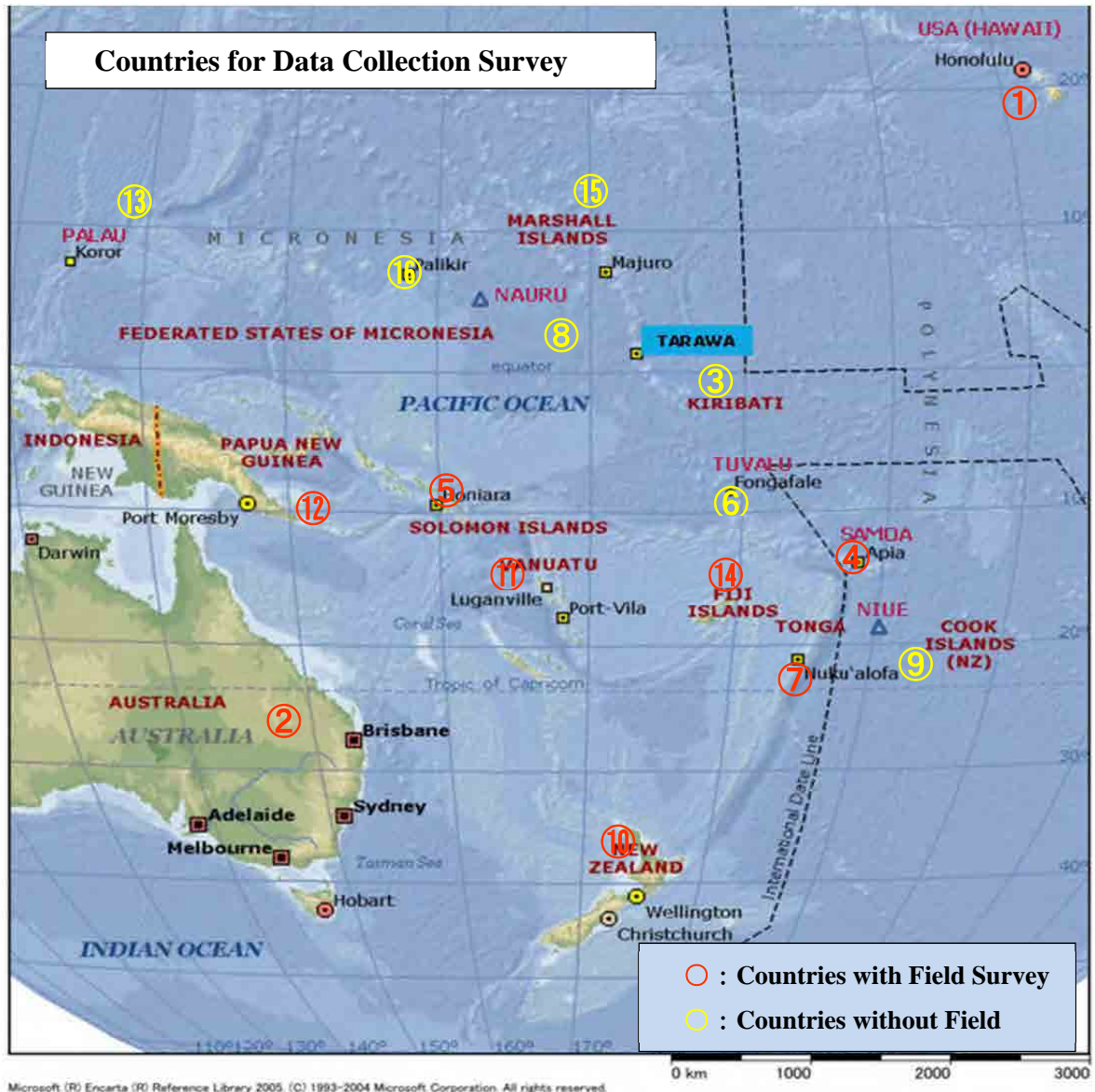
FINAL REPORT**

APRIL 2012

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

**YACHIYO ENGINEERING CO., LTD.
INTERNATIONAL METEOROLOGICAL CONSULTANT INC.**

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No.	Targeted Countries	Field Survey	Capital City	Population (Thousand)
1	United States of America (Hawaii State)	○	-	1,360.0
2	Australia	○	Canberra	21,293.0
3	Republic o Kiribati	○	Tarawa	100.8
4	Independent State of Samoa	○	Apia	179.0
5	Solomon islands	○	Honiara	523.0
6	Tuvalu	○	Funafuti	9.7
7	Kingdom of Tonga	○	Nuku'alofa	104.0
8	Republic of Nauru	○	Yaren District	9.3
9	Niue	○	Alfi	2.2
10	New Zealand	○	Wellington	4,266.0
11	Republic of Vanuatu	○	Port Vila	240.0
12	Independent States of Papua New Guinea	○	Port Moresby	6,732.0
13	Republic of Palau	○	Melekeok	20.3
14	Republic of Fiji	○	Suva	849.0
15	Republic of Marshall Island	○	Majuro	62.0
16	Federated State of Micronesia	○	Palikir	108.2



Under Operation for flood in Ba area (Fiji)



National Emergency Management Office
(NEMO, Solomon)



NEMO (Tonga)



NEMO (Samoa)



Fiji Meteorological Service (FMS)



FMS, Inside



Solomon Islands Meteorological Division



PNG Meteorological Service



PNG Meteorological Service Inside



Vanuatu Meteorological Service



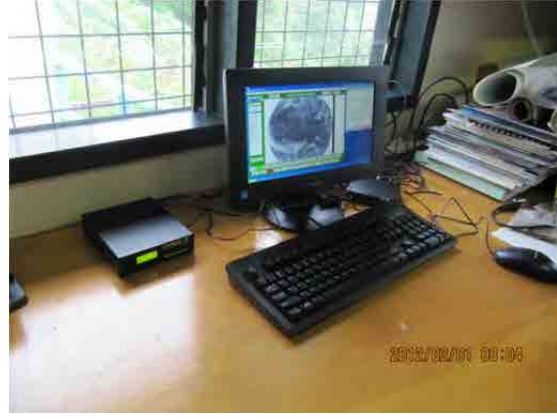
Tonga Meteorological Service



Samoa Meteorological Division



Samoa Meteorological Division, Inside



Fiji Seismology Sec., Mineral Resources Dept.,
Information from PTWC



Solomon Seismology Sec., Geology Dept.



Vanuatu Meteorology and Geo-hazards Dept.



Tonga Geological Service Unit



Samoa Geophysical Sec., Meteorology Div.



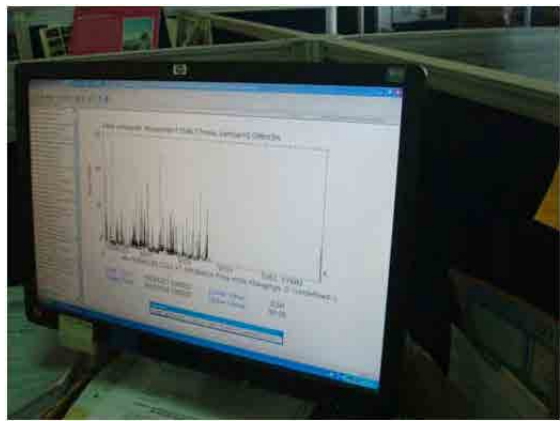
Inundation in Ba area, Fiji (Jan. 2012)



Inundation around Nadi River, Fiji (Jan. 2012)



Training on hydrological analysis by JICA, Solomon (2012.2)



Water Resources Branch (WRB), PNG
Output of river flow fluctuation



Abandoned house due to drainage, in Nuku'alofa, Tonga (Feb, 2012)



Radio station's equipment, Solomon

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Abbreviations

ADB	: Asian Development Bank
AusAID	: The Australia Agency for International Development
CCA	: Climate Change Adaptation
CIM	: Coastal Infrastructure Management
CROP	: Council of Regional Organization in the Pacific
DDC	: District Disaster Committee
DRM	: Disaster Risk Management
DRR	: Disaster Risk Reduction
EU	: European Union
FMS	: Fiji Meteorological Service
GEF	: Global Environment Facility
HFA	: Hyogo Framework for Action
HYCOS	: Hydrological Cycle Observation System
IDA	: International Development Association
IWRM	: Integrated Water Resources Management
JICA	: Japan International Cooperation Agency
DDC	: District Disaster Committee
LDC	: Least Developed Country
NACCC	: National Committee of Climate Change
NAP	: National Action Plan (for Disaster Risk Reduction)
NAPA	: National Adaptation Programmes for Action
NDC	: National Disaster Council (Center)
NDMO	: National Disaster Management Office
NEMO	: National Emergency Management Office
NIWA	: National Institute for Water and Atmosphere Research of NZ
NOAA	: National Oceanic and Atmospheric Administration
NZAP	: New Zealand Aid Programme
PALM5	: The fifth Pacific Islands Leaders Meeting
PDC	: Provincial Disaster Committee
PIF	: Pacific Islands Forum
PTWC	: Pacific Tsunami Warning Center
PWD	: Ministry of Public Works
PUB	: Public Utilities Board
RSMC	: Regional Special Meteorological Center
SIWA	: Solomon Islands Water Authority
SIMS	: Solomon Islands Meteorological Service
SOP	: Standard Operating Procedure
SOPAC	: South Pacific Applied Geoscience Commission
SPC	: Secretariat of the Pacific Community
SPREP	: South Pacific Regional Environmental Programme
UNDP	: United Nations Development Programme
UNOCHA	: United Nations Office for Coordination of Human Affairs
USAID	: United States Agency for International Development
USP	: University of South Pacific
VANRIS	: Vanuatu National Resources Information System
WAF	: Water Authority of Fiji
WHO	: World Health Organization
WRD	: Water Resources Division
WMO	: World Meteorological Organization
WB	: World Bank

Names of Countries

The formal names of countries and the names used in the report are shown as follows.

List of the Countries

Formal Name	Name used in the Report
Republic of Fiji	Fiji
Solomon Island	Solomon
Independent State of Papua New Guinea	PNG
Republic of Vanuatu	Vanuatu
Kingdom of Tonga	Tonga
Independent State of Samoa	Samoa
Republic of Nauru	Nauru
Tuvalu	Tuvalu
Niue	Niue
Palau	Palau
Federated State of Micronesia	Micronesia
Marshall Island	Marshall
Republic of Kiribati	Kiribati

Local Currencies and Exchange Rates (as of January-March, 2012)

Local Currencies, Currency Signs and Exchange Rates in Japanese Yen

Name of Country	Local Currency	Currency Sign	Exchange Rate (J. Yen)
Fiji	Fiji Dollar	F\$	47
Solomon	Solomon Dollar	S\$	10
PNG	Kina	PGK	43
Vanuatu	Vatu	Vt	0.9
Tonga	Pa Anga	TOP	52
Samoa	Samoa Tala	WST	36
New Zealand	NZ Dollar	NZ\$	75
Australia	Australian Dollar	Aus\$	114
USA	American Dollar	US\$	80
EU	Euro	EUR	107

Summary

1. Outline of the Survey

1.1 Background

Pacific islands are extremely vulnerable to the natural disasters. Besides, it is predicted that Climate Change due to global warming will increase wind speed and rainfall of tropical cyclones, which will lead to the increase of floods and landslides in the Pacific. Moreover, earthquakes and tsunami occurred in the areas around Solomon Sea and Tonga Trench where the plate boundaries exist. Earthquakes and tsunami seriously affect the Pacific. Therefore, implementation of strategic countermeasures against natural disasters has been an urgent issue in the Region.

Under these circumstances, the assistances from donor countries such as Japan, Australia, New Zealand etc. also play an important role. The regional cooperation, Pacific Tsunami Warning Center (PTWC) in Hawaii and Regional Specialized Meteorological Centre (RSMC) in Fiji, provide useful information. Moreover, Japan Meteorological Agency (JMA) has greatly contributed to the alleviation of natural calamities in the Pacific. JICA has conducted several assistances under the “Disaster Prevention Programme” that is for risk mitigation of natural disasters accelerated by Climate Change. However, countries in the Pacific are facing a lack of finance and manpower. Thereby, in order to mitigate natural disasters, mutual collaboration with donor countries and interregional cooperation & network are required.

1.2 Purpose

- To collect and confirm the basic information about disaster prevention against natural disasters in the Pacific
- To analyze the current problems of disaster prevention in the Pacific and to prepare the required information for formulation of ODA programmes.

1.3 Surveyed Countries and Collected Information

The team visited the following nine countries:

- ① United States of America (Hawaii), ② Fiji, ③ Solomon, ④ PNG, ⑤ Vanuatu, ⑥ Tonga,
⑦ Samoa, ⑧ New Zealand, ⑨ Australia

The countries surveyed without visit are following seven.

- ① Tuvalu, ② Niue, ③ Palau, ④ Micronesia, ⑤ Marshall, ⑥ Kiribati, ⑦ Nauru

Following field of data were collected:

- ① Administration and organization for disaster risk reduction, ② Weather observation and forecasting,
③ Earthquake / Tsunami observation and early warning, ④ Cyclone, flood and landslide,
⑤ Communication and information system

1.4 Work Schedule and Staffing

Working period is four months from January to April 2012, including the field survey for 52 days. The survey team is composed of five members. Each of them is assigned with each field of profession mentioned above.

2. Result of the Survey

2.1 Disasters in the Pacific

The disasters in the countries that the mission visited are characterized as below

1) Fiji

Cyclone, flood and land slide occurred frequently. Rapid urbanization and illegal habitation in urban area enhances damages. The disaster is prominent on the low land in in the western area of Viti Levu Is..

2) Solomon

Cyclone, flood and landslide occurred frequently. There were earthquake and tsunami damages in 2007.

3) PNG

Cyclone, flood and landslide occurred frequently. Tsunami and volcanic eruption also occurred. There was tsunami damage in 1998.

4) Vanuatu

Cyclone, flood, high tide and earthquake occurred frequently. Urbanization is causing increased flood damages.

5) Tonga

Cyclone and high tide occurred frequently. There were earth quake and tsunami damages in 2009. There is a drainage problem in the low land along the coast in the capital

6) Samoa

Cyclone and high tide occurred frequently. There were earthquake and tsunami damages in 2009.

2.2 Current Situation of Disaster Risk Reduction in the Countries

The current situation of the activities for disaster risk reduction on the countries is summarized below.

1) Administration and organizations

In every country except PNG, disaster risk reduction is mainstreamed in a national policy. In every country, the basic act and national plan for disaster risk reduction have been stipulated. National Disaster Council (NDC), and responsible organization for disaster risk reduction on national level, and National Disaster Management Office (NDMO), or its identical agencies, responsible for disaster management on national level, are instituted. During disaster occurrence, and disaster operation center is set up. NDC members are gathered and urgent response is conducted. On the other hand, preparation of SOP and setting up of disaster management organizations on local level are not progressing well. Awareness and knowledge on importance of preparedness in communities are in sufficient.

2) Weather observation and Forecast

Counties except Fiji and Vanuatu fulfill a minimum role by offering own weather observation data to the world through GTS as a member of WMO. The data of these countries is sent to GTS Regional Telecommunication Hub (RTH, either to Melbourne or to Wellington) by e-mail, and these data are provided for GTS by RTH. Obtaining foreign observation data from GTS is impossible. Furthermore, weather observation network itself is vulnerable and it will suffer a great deal of damage by disasters, such as a cyclone and a heavy rain. When it suffers damage, it is easy to fall into the situation that data is no available. Moreover, most upper air observations are not conducted due to budget restriction.

3) Observation of Earthquake and Tsunami Observation

The type of seismograph used in the South Pacific countries is an old analogue type except Fiji and Tonga. In the two countries a digital type was installed by Japan's assistance. Analogue seismograph cannot send real-time data to the head office. It is difficult to analyzing epicenter. A common situation in the region is; ① Information of epicenter and intensity of earthquake is fully dependent on international organization of PTWC and CISN. ② It is difficult to maintain monitoring 24 hours shift due to lack of human resources and budget. ③ Proper maintenance of monitoring equipment is not conducted due to shortage of staff.

4) Cyclone, Flood and Landslide

Preceding other countries, Fiji has introduced the flood forecasting and warning system. Monitoring for rainfall and river water level is carried out. Forecasting of flood and recommendation for evacuation are practiced in main rivers. In Salomon, PNG, Vanuatu, and Samoa, monitoring for flood control is not carried out although hydrological monitoring for water use is carried out. In these countries, priority of flood control is low and budget allocation is insufficient. Higher priority is given to water resources development and other sectors. Budget and number of staffs are insufficient.

5) Information and Communication System

Other than PNG, each country has inter-government network (G2G) management body to make information sharing smooth. Between governmental institutes and local government network (G2LG), information-handling capacity becomes very low when it comes to a worst scenario due to disasters; internet connection shut down (no e-mail) and only voice over landline (telephone) available. In visited countries, use of cellphone network in community residents has been very popular. Therefore, capacity of community residents to transmit information will increase. Samoa has incorporated the advanced system, while most of the countries have not yet implemented emergency information liaison system to get advantage of the current advanced changes.

2.3 Regional Basis and Frameworks

University of South Pacific (USP) and Pacific Tsunami Warning Center (PTWC) exist as regional basis. South Pacific Applied Geoscience Commission (SOPAC), and South Pacific Regional

Environmental Programme (SPREP) exist as regional framework. These organizations are indispensable for DRR in the region. Their outlines are summarized below.

Table 1 Outline of Regional Organizations

Organizations	Location	Activities	Survey Results
The University of South Pacific (USP)	Fiji, Suva	Founded by 12 nations cooperation in the Pacific. Activities on a climate change, biodiversity, comprehensive coastal management, land use and ecosystem change are carried out.	Disaster Risk Management Course has been established in graduate school to be an research institute of disaster risk reduction of the member counties.
Pacific Tsunami Warning Center (PTWC)	USA, Hawaii,	Tsunami warning organization under North Oceania and Atmospheric Administration (NOAA). Tsunami warning in the Pacific is carried out.	In the countries the site survey was conducted, earthquake and tsunami information is received and tsunami warning is issued
South Pacific Applied Geoscience Commission (SOPAC)	Fiji, Suva	SOPAC is one of the organizations within SPC(Secretariat of the Pacific Community), a regional cooperation association centering on archipelagic countries in the Pacific. In order to aim at improvement in daily life of people in the Pacific Islands, activities which apply to earth science for the management and sustainable development on non-bio resources are performed. There are programs on water, health, energy, coastal resource control, and disaster management. Formulation on disaster prevention action plan at the national level is supported.	Regarding DRR, Community Risk Programme was commenced on 1995. This programme is composed of the 3 components: 1)Capacity development for disaster management 2)Disaster damage Reduction 3)Mainstreaming integrated disaster risk management
South Pacific Regional Environmental Programme (SPREP)	Samoa, Apia	Independent inter-governmental community organization established by the countries in the South Pacific. Promotion of regional cooperation on environmental issues in the Pacific, activities for protection and improvement on the environment towards the sustainable development are carried out.	Regarding "Climate Change Adaptation" for disaster risk reduction, following two are regarded as key sectors ① Water Management ② Coastal Infrastructure

2.4 Donors and International Organizations

Outline of activities of donors and international organizations in the Pacific are summarized below. They are tabulated by countries. Cumulative numbers of activities, since before 2009 till 2012, are tabulated by countries and by categories. There are many projects by Japan and Australia. By categories, there are the most projects in disaster management, while weather observation stands out in the Regional.

Table 2 Activities of Donors and International Organizations in the Pacific

Countries	Donor	Disaster Management	Weather	Flood	Cyclone	Earthquake	Tsunami	Volcano
Fiji	Japan	1	3	2		1		
	Australia	6						
	New Zealand	3			1			
	France			2				
	EU			3				
	World Bank			1				
	UNDP			1				
Solomon	Japan	3	0	2	1			
	Australia	7		1				
	New Zealand	1		1				

Countries	Donor	Disaster Management	Weather	Flood	Cyclone	Earthquake	Tsunami	Volcano
	EU		1					
	World Bank		1					
	ADB					2		
	UNDP			2		1	1	
	UNICEF	1						
PNG	Australia	4	1			1	1	1
Vanuatu	Japan		2					
	Australia	7	1		1			
	New Zealand							1
	France		1				1	
	USA	2						
	China						1	
	World Bank	1						
	UNDP	1						
	UNICEF	2						
Tonga	Japan		4				1	
	Australia	1						
	World Bank				1	1		
Samoa	Japan		5					
	Australia	2						
	China					1		
	World Bank	1			1			
Regional	Japan		2	2			2	
	Australia	6				1		
	New Zealand	1						1
	EU	3	2					
	GEF		1					
	ADB	1	3					
	UNDP	2	1					
	UNOCHA	2	1	1	1	1		1
	UNESCO	1	1					
	UNEP		1					

Note)

PDMCs: Pacific Developing Member Countries (Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, PNG, Samoa, Solomon Islands, Timor- Leste, Tonga, Tuvalu, Vanuatu)

PICs: Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, PNG, Samoa, Solomon Islands, Timor Leste, Tonga

(MOF Japan HP, JICA HP)

3. Problems, Issues, and Evaluation

3.1 Problems and Issues

Problems and Issues are summarized below.

1) Administration and Organizations

The capacity of NDMOs is needed to be developed further, as the scale of NDMO is small in each country and the resources should be utilized at its maximum. Making SOP in disaster related organizations establishing local administrative systems and promotion of awareness/preparedness in communities are urgent issues. In PNG, disaster risk reduction should be mainstreamed in national policy.

2) Weather Observation and Forecast

It is the common problem of the Pacific that the upper air observation cannot be stably conducted due to financial problem except Samoa where a wind profiler is provided by Japan's grant aid. In order to increase the precision of numerical weather prediction, improvement of this situation is required. Fiji, Vanuatu, Salomon, and Papua New Guinea have concrete plans for improvement of weather observation network with assistance by donors while there is no such plan for Tonga. Tonga needs to improve this situation..

3) Earthquake and Tsunami Observation

Since observational data are not be monitored by 24 hours shift except in Tonga, collecting information and issuing tsunami warning will be delayed if an earthquake occurs in off-duty time. In some remote islands, radio broadcast or mobile phone are not in service. It is impossible to transmit warning announcement without such system to these islands. Maintenance of the equipment at distant places is difficult due to lack of funds and staff. The operation is suspended until proper maintenance has been done. The countries can receive information of far-tsunami from PTWC and/or CISM, while monitoring system for near-tsunami is needs to be improved.

4) Cyclone, Flood and Landslide

Fiji has reached a certain level in hydrological monitoring and flood forecasting. However, in any of the visited countries, an integrated organization which manages disaster risk reduction for flood and landslide does not exist. There is no engineer specialized in flood control. Instituting an integrated organization for flood control and an employment of engineers are the issues to be solved with high priority.

5) Information and Communication System

There are remote islands and areas where warning does not reach due to uncompleted network by national radio broadcast or mobile telephones. The network in inter-governmental institutes (G2G), the network between governmental institutes and local government (G2LG), and the network between governmental institutes and citizens (G2C), need redundancy. In most countries, adding diversity to network equipment is the number one priority. In most of the cases, hardware component is advanced, while software components such as organizational formation and capacity building are the remaining issues. In information gathering at affected sites, capacity development of NDMO to utilize IT services and IT literacy improvement of community inhabitants are major issues. Currently, Samoa and Fiji have been most advanced in this area.

3.2 Evaluation on Current Disaster Management

Current situation of disaster management mentioned so far has been evaluated and tabulated below.

Table 3 Index for Evaluation

A	B	C	D
Sufficient countermeasures are conducted.	Minimum countermeasures are conducted	Countermeasures are insufficient. Responsible organization(s) exists, or partly exists, but there have been no activity.	There is no responsible organization or staff.

Table 4 Evaluation on Administration and Organizations

	Laws and Plans	National Administration	Local Administration	Urgent Response	Warning System	SOP National Level	SOP Local Level	Awareness	Capacity of NDMO Staff	Over All Evaluation
Fiji	A	A	A	A	B	B	C	B	B	B
Solomon	A	A	A	A	B	B	C	B	B	B
PNG	B	B	B	B	B	C	C	C	C	C
Vanuatu	A	A	B	A	B	C	C	C	B	B
Tonga	A	A	A	A	B	B	C	B	C	B
Samoa	A	A	B	A	B	B	C	B	B	B

Table 5 Evaluation on Weather Observation and Forecast

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Assistance from Donor	Over All Evaluation
Fiji	B	B	B	A	A	B	—	B
Solomon	B	B	B	B	B	B	—	B
PNG	B	B	B	B	B	—	—	B
Vanuatu	B	B	B	B	B	—	—	B
Tonga	B	B	B	B	B	—	—	B
Samoa	B	B	B	B	B	—	—	B

Table 6 Evaluation of Earthquake and Tsunami

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Over All Evaluation
Fiji	B	B	B	A	B	—	B
Solomon	B	B	B	A	C	—	B
PNG	B	B	B	B	B	—	B
Vanuatu	B	B	B	A	B	—	B
Tonga	B	B	B	B	C	—	B
Samoa	B	A	B	A	A	—	A

Table 7 Evaluation on Cyclone, Flood and Landslide

	Institution	Engineers	Hydrological Monitoring	Flood Forecast & Warning System	Information / Communication	Non-Structural Measures	Structural Measures	Community based Disaster Prevention	Over All Evaluation
Fiji	B	B	A	A	B	C	B	A	B
Solomon	C	D	B	B	B	C	C	A	B
PNG	C	D	C	D	B	C	C	C	C
Vanuatu	C	D	C	D	B	C	C	B	C
Tonga	C	D	D	D	B	C	C	B	C
Samoa	C	D	D	D	A	C	B	C	C

Table 8 Evaluation on Information and Communication System

	Organiz ation	Human Resource	G2G Network	G2LG Network	G2CNet work	Disaster Warning	Information Liaison	Com munity	Overall Evaluation
Fiji	B	B	B	A	A	B	B	B	B
Solomon	B	C	B	C	C	B	C	D	C
PNG	D	D	D	D	C	C	D	D	D
Vanuatu	B	B	A	B	B	B	C	B	B
Tonga	C	B	B	B	A	B	C	C	B
Samoa	A	A	A	A	A	A	A	A	A

4. Proposed Assistance

4.1 Principles for Proposals

Proposed assistance has been prepared based on the principles as follow.

(1) Sustainability with local resources

Scale and contents of the assistance are determined such that the sustainability be secured with local resources.

(2) Regional assistance

Regional assistance is proposed in case

- ①there are common issues in the region
- ②network over the region is needed. T

4.2 Proposed Assistance

In administration and organizations, making of SOP and capacity development of manpower are emphasized, as these are the basics of disaster risk reduction. In weather observation, construction of network with collaboration by the countries of the Region is aimed. Upper air observation network and GTS system building, with Fiji Met, Service, that has relatively advanced technology, as its core organization. In earthquake and tsunami, the construction of network proposed by Vanuatu Met, Service is effective as countermeasures for tsunami caused by nearby earthquake. In this system, real time earthquake information monitored in countries of the Region is obtained and earthquake analysis is conducted based on the data from extended areas In cyclones and flood, integration of administrative organizations and capacity development of manpower is essential. For frequent floods occurring in Fiji, countermeasures should be conducted urgently. Both structural and nonstructural methods will be applied. Awareness in the Region on flood is enhanced with this project as a model. In information and communication, capacity development of the local resources is the basic. Proposed assistance is tabulated below. The bold letters show items with priority.

Table 9 Implementation plan of the proposed assistance

Administration and Organizations	
Name of Assistance	Capacity development of administration and organizations related to disaster risk reduction in the Pacific
Central Issues	1)Promotion of preparing SOP 2)Promotion of set up of organizations on local level 3)Capacity development of DRR organizations , such as NDMO, and staves

	4)Promotion of awareness in the communities								
Project Name	Scheme	Implementation Period (2013-2017,18-)						Target Countries	
		13	14	15	16	17	18 ~		
Promotion of preparing SOP/ Capacity development of organizations on local level	Technical cooperation		○	○	○	○		The Pacific countries	
Capacity development of NDMO	Dispatching experts Training in Japan		○	○	○	○		do	
Promotion of awareness in communities	Dispatching experts Training in Japan	○	○					do	
	Technical cooperation		○	○	○	○	○	do	
Weather Observation and Forecast									
The Improvement of the Surveillance Capability of Meteorological Disaster and Climate Change by Global Warming in the Pacific Region, and Strengthening of the Receiving Capability of Weather, Earthquake, and Tsunami Information.	Name of the Assistance								
	The Provision of Surface and Upper Air Observation for Surveillance of Meteorological Disaster and Climate Change by Global Warming in the Pacific Region, and Meteorological, Earthquake and Tsunami Information Receiving Network.								
	Outline	Type of Assistance	Implementation Period(2013-2017,18-)						Target Countries
			13	14	15	16	17	18 ~	
	Provision of • Surface Weather Observation Equipment • Upper Air Weather Observation Equipment • VSAT Telecommunication Equipment • Sea Water Level Observation Equipment • GTS Message Switch Equipment	Provision of Equipment (Grant Aid)	○	○	○	○			13 Countries in the Pacific Region; Fiji, Salomon, PNG, Vanuatu, Tonga, Samoa, Kiribati, Tuvalu, Nauru, Niue, Palau, Marshall, Micronesia
	• Equipment Operation and Maintenance • Data Quality Control • Dissemination of Weather Information • Weather Forecast	Technical Cooperation			○	○	○	○	Place of the Training: Training Room of Fiji Meteorological Services (Conducting to the counterpart of each meteorological organization in the Pacific Region)
Training on Weather and Climatology	Training					○			
Earthquake and Tsunami Observation									
Name of Assistance	Consolidation of earthquake observation system to mitigate tsunami risk in the South Pacific Region								
Central Issues	1)Set up the facilities to enable emergency response for near-earthquake by earning real time and accurate information 2)Assist the construction of ORSNET (Ocean Regional Seismic Network for Earth) , which enables receive earthquake observation data at real time and conduct seismologic analysis								

based on information gathered from broad areas.								
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Establishment of Tsunami Observation and Forecasting Network	Provision of Equipment		○	○	○	○	○	Fiji, Solomon, PNG, Vanuatu, Tonga, Samoa
Maintenance and Management for Equipment	Technical Cooperation			○	○	○	○	do
CB for Tsunami Forecasting	Technical Cooperation			○	○	○	○	do
Cyclone, Flood and Landslide								
Name of Assistance	Capacity building for countermeasures against cyclones, floods and landslides							
Central Issues	1)Education and training of engineers for flood control, river / sabo engineering 2)Making planning for flood / sediment control, and integrated water resources management 3)Integration of government organizations responsible for flood control 4)Non-structural countermeasures 5)Empowering the DRR capacity in communities							
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Increase of River Management Engineer	Expert & Training	○	○	○	○	○	○	Fiji, Solomon, PNG, Tonga, Samoa
IWRM	Master Plan/ Feasibility Study	○	○					Nadi River in Fiji Coastal zone of Nuku'alofa in Tonga
Integration & Strengthening of government Organization	Expert & Training	○	○	○	○	○		Fiji, Solomon, PNG, Vanuatu, Tonga, Samoa
Non-structural Measures	Expert & Training	○	○	○				Fiji
CB for Community Based Disaster Management	Technical Cooperation	○	○	○	○	○	○	Fiji, Solomon
Information and Communication System								
Name of Assistance	Development of emergency information gathering / delivery system and capacity building for operation and maintenance							
Central Issues	System that enables efficient gathering and prompt delivery of information by synchronizing information gathering / delivery system and siren warning is constructed.							
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Development of Information management System	Technical Cooperation		○	○	○	○	○	Fiji, Solomon Islands, PNG, Vanuatu, Tonga, Samoa
Same as above	Training in Japan	○	○	○	○	○		do
Overall Management of Information Gathering and Delivery System	Dispatching experts	○	○	○	○	○		do

4.3 Conclusion and Recommendation

Capacity development in administration is needed to enforce government organizations, by preparing SOP, for an example. Making of an earthquake observation network and an upper air observation system are proposed assistance with priority. Regarding flood control, implementation of

the project around Nadi area has high priority. In parallel, capacity development in communities to enhance awareness on mutual help/self help is needed. Expanding identical activities with the project being conducted in Fiji and Solomon by JICA at present to other sites and countries, will be effective. Making collaboration network in the Region is important, since resources of each country is limited both in budget and manpower. In studying details of each project, the scale and contents should be determined so that sustainability is secured with local resources. Conclusion and recommendation is summarized below.

1) Administration and Organizations

In each country, the act and action plan have been prepared. Organizations, such as NDC and NDMO are instituted. However, making of SOP, construction of organizations on local level, and promotion of capacity in communities are needed. Capacity development of NDMO, coordination body of disaster management, is an important issue. It is effective to apply the knowledge/technology of Japan endorsed by past experiences (preparedness for disasters beyond design scale, for example) to these issues.

2) Weather observation and Forecast

Since the upper air observation is rarely conducted in the South Pacific, the region is a blank zone of the upper air observation. When an upper air observation is conducted in the region, by sharing the data among the world, the information contributes to improvement in the weather forecast accuracy of each country. At the same time, the accuracy of the weather product which advanced nations create improves, and it is fed back to the region again. For this purpose, installation of the wind profiler for performing an upper air observation and the connection with GTS for data sharing are indispensable.

3) Earthquake and Tsunami Observation

Every country can receive seismic data from PTWC and CISN, which enables the countries prepare for tsunami caused by far-earthquakes. However most of countries have no solution for monitoring tsunami caused by near-earthquakes. It is needed to establish monitoring system for near-tsunami.

4) Cyclone, Flood and Landslide

The damages caused by flood and landslide in Fiji are large. The benefits yielded by the project implementation will be high. The priority of the project implementation for flood control in this country is high. The effects of on-going technical cooperation of JICA for capacity development in communities are appearing gradually in Fiji and Solomon. Identical projects shall be executed in other sites of the countries or in other countries of the Pacific. As for the capital and its neighbor areas of the countries where urbanization is progressing, the identification on present situation of urbanization, land use condition, and city drainage system will be required. Japan has the advanced technology on

flood analysis, comprehensive flood control measures on urban areas, and the integrated water resources management. Such knowledge can be applied to solve the problems in the Pacific.

5) Information and Communication System

Emergency information management system in each country is mainly targeted at tropical cyclones. In most of the cases, it is manually-operated and it has not been sufficient systems. Fortunately in each country, cellphone network service is becoming very popular. With cellphone devices, community inhabitants' ability is potentially becoming higher. Introducing emergency information system cooperated with cellphone network services may increase efficiency of NDMO. It will mediate information gathering and delivery between NDMO and community inhabitants and reduce workload of intermediating organizations. Automated workflow may speed up process of information delivery. For now, in order to add efficiency on DRR, it is very important to manage information with leading-edge technology and knowledge of service development. Technologies which Japan has on this aspects will contribute to these countries.

Chapter 1 OUTLINE OF THE SURVEY

1.1 Background

Pacific islands are extremely vulnerable to the natural disasters. Besides, it is predicted that Climate Change due to global warming will increase wind speed and rainfall of tropical cyclones, which will lead to the increase of floods and landslides in the Pacific. Moreover, earthquakes and tsunami occurred in the areas around Solomon Sea and Tonga Trench where the plate boundaries exist. Earthquakes and tsunami seriously affect the Pacific. Therefore, implementation of strategic countermeasures against natural disasters has been an urgent issue in the Region.

Under these circumstances, Pacific Islands Forum (PIF) and Council of Regional Organizations in the Pacific (CROP) have been established to undertake disaster prevention in the Pacific and the assistances from donor countries such as Japan, Australia, New Zealand etc. also play an important role. The regional cooperation, Pacific Tsunami Warning Center (PTWC) in Hawaii and Regional Specialized Meteorological Centre (RSMC) in Fiji, provide the useful information. Moreover, Japan Meteorological Agency (JMA) has greatly contributed to the alleviation of natural calamities in the Pacific. JICA has conducted several assistances under the “Disaster Prevention Programme” that is for risk mitigation of natural disasters accelerated by Climate Change. However, countries in the Pacific are facing a lack of finance and manpower. Thereby, in order to mitigate natural disasters, mutual collaboration with donor countries and interregional cooperation & network are highly required.

1.2 Purpose

- To collect and confirm the basic information about disaster risk reduction (DRR) in the Pacific
- To analyze the current problems of DRR in the Pacific and to prepare the required information for formulation of assistance.

1.3 Countries of the Survey and Kinds of Disaster

The survey was conducted in following sixteen (16) countries

United States of America (State of Hawaii), Commonwealth of Australia, New Zealand, Republic of Fiji, Independent State of Papua New Guinea (hereinafter referred to as “PNG”), Solomon Islands, Republic of Vanuatu, Kingdom of Tonga, Independent State of Samoa, Republic of Nauru, Tuvalu, Niue, Republic of Palau, Federated States of Micronesia, Republic of the Marshall Islands and Republic of Kiribati. Of these, field survey will be conducted in nine (9) countries shown in the table below.

The disasters in this survey are earthquake / tsunami and cyclone/flood/landslide. The survey team will figure out the current situation of national / regional DRR activities in terms of administration / organizations, weather observation / forecasting and information / communication system

Table 1-1 Information To Be Collected

Name of Country	Administration/ Organizations	Weather Observation/ Forecasting	Information/ Communication System	Earthquakes/ Tsunami	Cyclone/Flood/ Landslide
US(Hawaii)	◎	◎	◎	◎	○
Australia	◎	◎	◎	○	○
New Zealand	◎	○	○	○	○
Fiji	◎	◎	◎	◎	◎
Solomon	◎	◎	◎	◎	◎
PNG	◎	◎	◎	◎	◎
Vanuatu	◎	◎	◎	◎	○
Tonga	◎	◎	◎	◎	○
Samoa	◎	◎	◎	○	○

◎ Major Disaster for Survey, ○ Disaster for Survey

1.4 Activities, Output, Project Purpose and Overall Goal

Activities, Output, Project Purpose and Overall Goal of this survey are summarized below.

Table 1-2 Activities, Output, Project Purpose and Overall Goal

Items	Contents
Overall Goal	Cooperation programs on disaster management in the Pacific are formulated and carried out, and the capability on disaster management in the region is enhanced.
Project Purpose	Information required for the cooperation program on disaster management in the Pacific is collected and identified.
Outputs	<ol style="list-style-type: none"> 1) Data on natural disasters including damage conditions for each country is collected and arranged. 2) The result of comparative analysis on organization and capacity for disaster management for each country is arranged. 3) Problems and issues on countermeasures for disaster management for each country are identified and arranged. 4) Cooperation programs for the disaster management in the Pacific are arranged and proposed.
Activities	<ol style="list-style-type: none"> 1) Collect and identify on the following information from related agencies/organizations of each country. <ol style="list-style-type: none"> a. Disaster management governmental agencies, such as the National Disaster Management Office (NDMO) b. Agencies/Organizations for emergency response and emergency restoration c. Agencies/Organizations for weather meteorological observation and weather forecast d. Agencies/Organizations for monitoring and early warning on earthquake and Tsunami. e. Agencies/Organizations for flood, Landslides, cyclone, and heavy rain. f. The organization in charge of cooperation from overseas g. Regional bases in the Pacific h. Cooperation framework in the Pacific i. Telecommunication system 2) Investigate the data accumulation of disaster information, emergency response and rehabilitation works 3) Investigate the needs and potential on improvement in disaster management capability for each country. 4) Investigate on the intention and expectation about the cooperation in the region. 5) Analyze the disaster management plan for each country and analyze the bottleneck of disaster mitigation/prevention 6) Make the comparative analysis among organizations and the capacity for the disaster mitigation/prevention of each country in the Pacific 7) Explain to the area bases and donors on previous cooperation outline by JICA 8) Explain historical experiences and lessons on disaster countermeasures, disaster restoration and disaster management plan in Japan. 9) Update the disaster management inventory for each country prepared by JICA.

1.5 Survey Schedule

(1) Work Schedule

Working period is four months from January to April, 2012, including the field survey for 52 days.

(2) Staffing Schedule

The survey team is composed of five specialists.

Table 1-3 Work Schedule and Staffing Schedule

Assignment	Name	Company
Team Leader Administration/Organization	YOKOKURA Junji	YACHIYO ENGINEERING CO.LTD
Weather Observation/Forecasting	ENDO Toshihide	INTERNATIONAL METEOROLOGICAL CONSULTING INC.
Earthquakes/Tsunami	SEKI Kazunori	PACET Corp.
Cyclone/Flood/Landslide	TAKAHASHI Toru	YACHIYO ENGINEERING CO.LTD
Information/Communication System	TANAKA Uyu	YACHIYO ENGINEERING CO.LTD

(3) Trip Schedule

Trip Schedule for visiting nine countries is shown on the following pages.

Table 1-5 Detailed Schedule

No.	month	date	day	time	Works done / Organization visited	Place of Stay
1	Jan.	25	Wed	19:50	Tokyo →JL076 → Honolulu	Honolulu
2	Jan	26	Thu	9:00 10:00 11:00	NOAA ITIC PTWC (NOAA)	Honolulu
3	Jan	27	Fri	8:10	Honolulu → FJ852	flight
4	Jan	28	Sat		→ Nadi →Suva	Suva
5	Jan	29	Sun			Suva
6	Jan	30	Mon	8:45 9:30 9:30 10:00 14:00	JICA Fiji Office Ministry of Provincial Development and National Disaster Management Digicel National Disaster Management Office (NDMO) Mineral Resources Department (MRD)	Suva
					Suva → Nadi	Nadi (ENDO)
7	Jan	31	Tue	9:00 9:00 14:00 14:00 9:00	Department of Environment (DOE) National Fire Authority (NFA) Water Authority of Fiji (WAF) Ministry of Education Fiji Meteorological Service (FMS)	Suva Nadi (ENDO)
8	Feb	1	Wed	9:00 11:00 13:30 15:30 15:30 9:00	University of South Pacific (USP) SOPAC Ministry of Finance / ITC Service AusAID NZAP Fiji Meteorological Service (FMS)	Suva Nadi (ENDO)
9	Feb	2	Thu	9:00 11:00 11:00 14:00 16:00	UNDP Pacific Center UNOCHA Fiji Red Cross World Bank JICA Fiji Office	
					Suva →Nadi	Nadi
				9:00	Fiji Meteorological Service (FMS)	Nadi
10	Feb	3	Fri	10:30 13:00	Fiji Meteorological Service (FMS) Nadi River	Nadi
11	Feb	4	Sat	9:20	Nadi → IE709 → Honiara	Honiara
12	Feb	5	Sun			Honiara
13	Feb	6	Mon	8:30 9:30 11:30 14:00 15:00 16:00	JICA Solomon Islands Office NDMO Ministry of Infrastructure and Development Meteorological Service World Bank Mr. Masaaki Kanaya	Honiara
14	Feb	7	Tue	9:00 11:00 14:00	AusAID Ministry of Lands, Housing & Survey UNDP	Honiara
15	Feb	8	Wed	9:00 10:00 13:00	Oxfam International Ministry of Mines, Energy, & Rural Electrification Telecom	Honiara
16	Feb	9	Thu	10:00 10:00 14:00	Red Cross Solomon Islands Broadcasting Cooperation (SIBC) European Union	Honiara
17	Feb	10	Fri	14:00	Embassy of Japan	Honiara

No.	month	date	day	time	Works done / Organization visited	Place of Stay
				15:00	JICA Solomon Islands Office	
18	Feb	11	Sat	11:10	Honiara → PX085 → Port Moresby	Port Moresby
19	Feb	12	Sun			Port Moresby
20	Feb	13	Mon	8:30 10:00 14:00	JICA Office Office of Prime Minister & NEC Department of National Planning and Monitoring	Port Moresby
21	Feb	14	Tue	14:00	Dept. of Mineral Policy & Geo-hazards Management	Port Moresby
22	Feb	15	Wed	9:00	World Bank	Port Moresby
23	Feb	16	Thu	9:00 11:00 14:00	EU PNG Office AusAID Ministry of Environment & Conservation	Port Moresby
24	Feb	17	Fri	9:00 16:00	National Weather service EOJ	Port Moresby
25	Feb	18	Sat			Port Moresby
26	Feb	19	Sun	13:30	Port Moresby → QF314 → Brisbane → QF377 → Port Villa	Port Villa
27	Feb	20	Mon	10:00 14:00 15:00	Dept. of Strategic Policy Planning/Aid Coordination Office of Prime Minister Dept. of Meteorology National Disaster Management Office (NDMO)	
28	Feb	21	Tue			Port Villa
29	Feb	22	Wed	9:00 10:00 14:00 15:00	Ministry of Lands, Energy, Environment, Geology, Mines and Water Resources Dept. of Public Works Ministry of Finance / Statistic Office Department of Environmental Protection and Conservation	Port Villa
30	Feb	23	Thu	8:00 9:00 10:00 14:00	NZAP Vanuatu Humanitarian Team Vanuatu Red Cross Society AusAID	Port Villa
31	Feb	24	Fri	9:00 10:00	UNICEF CARE International	Port Villa
32	Feb	25	Sat	7:00	Port Villa → NF050 → Auckland → NZ974 → Nuku'alofa	Nuku'alofa
33	Feb	26	Sun			Nuku'alofa
34	Feb	27	Mon	11:30 14:00 15:30	JICA, EOJ Ministry of Works and Disaster Relief Activities AusAID	Nuku'alofa
35	Feb	28	Tue	9:00 11:00 14:00 15:30	Ministry of Environment & Climate Change NZAP National Emergency Management Office Meteorological Service	Nuku'alofa
36	Feb	29	Wed.	9:30 11:00 14:00 15:30	UNDP Civil Society Forum of Tonga Tonga Red Cross Society ADB/World Bank	Nuku'alofa
37	Mar.	1	Thu	9:00 11:00	Geological Service Unit Aid and Planning Div./ Ministry of Finance and National Planning	Nuku'alofa

No.	month	date	day	time	Works done / Organization visited	Place of Stay
				14:00	Planning and Urban Management Agency, Ministry of Lands, Survey and Natural Resources	
38	Mar	2	Fri	9:30 18:00	Ministry of Environment and Climate Change JICA, EOJ	Nuku'alofa
39	Mar	3	Sat	19:30	Nuku'alofa →NZ975 →Auckland	Auckland
40	Mar	4	Sun	20:05	Auckland →NZ994 →Apia	Apia
41	Mar	5	Mon.	9:00 10:00 11:00 13:00 14:00 14:00 15:00	JICA Samoa Office Ministry of Natural Resources and Environment / Meteorology Division NEMO Ministry of Natural Resources and Environment / Climate Change Unit Ministry of Natural Resources and Environment / Meteorology Division Ministry of Natural Resources and Environment / IT Unit Ministry of Natural Resources and Environment / Meteorology Div./ Geophysical Section	Apia
42	Mar	6	Tue	9:00 10:00 13:00 14:00	United Nations Development Programme (UNDP) / Development Advisory Services Programmes Secretariat of the Pacific Regional Environment Programme (SPREP) / (P1) Climate Change Fire Authority Ministry of Works, Transport and Infrastructure	Apia
43	Mar	7	Wed	10:00 11:00	Ministry of Natural Resources and Environment/ Land Resources Division Ministry of Works Transport and Infrastructure	Apia
44	Mar	8	Thu	11:00 15:00	Ministry of Natural Resource and Environment / Water Resource Division National Radio	Apia
45	Mar	9	Fri	14:00	JICA Samoa Office	Apia
46	Mar	10	Sat	2:00	Apia → NZ991 → Auckland → NZ405 →Wellington	Wellington
47	Mar	11	Sun			Wellington
48	Mar	12	Mon	10:00	Ministry of Foreign Affairs & Trade / New Zealand Aid Programme / Pacific Development Division	Wellington
49	Mar	13	Tue	9:30	Ministry of Civil Defense & Emergency Management	Wellington
				11:00	National Institute of Water & Atmospheric Research Ltd.	
				15:00	Wellington → QF038 → Melbourne → QF822 →Canberra	Canberra (YOKOKURA)
					Wellington → QF038 → Melbourne	Melbourne (ENDO)
50	Mar	14	Wed	11:00	Australian Agency for International Development	Canberra (YOKOKURA)
				10:00	Bureau of Meteorology/Australia	Melbourne (ENDO)
51	Mar	15	Thu		Canberra → QF806 → Sydney → QF021	flight
					Melbourne → QF490 → Sydney → QF021	flight
52	Mar	16	Fri		→Tokyo	

Chapter 2 RESULT OF SITE SURVEY

2.1 Disasters in the Pacific

The disasters in the countries that the mission visited are characterized as below

1) Fiji

Cyclone, flood and land slide occurred frequently. Rapid urbanization and illegal habitation in urban area enhances damages. The disaster is prominent on the low land in in the western area of Viti Levu Is..

2) Solomon

Cyclone, flood and landslide occurred frequently. There were earthquake and tsunami damages in 2007.

3) PNG

Cyclone, flood and landslide occurred frequently. Tsunami and volcanic eruption also occurred. There was tsunami damage in 1998.

4) Vanuatu

Cyclone, flood, high tide and earthquake occurred frequently. Urbanization is causing increased flood damages.

5) Tonga

Cyclone and high tide occurred frequently. There were earth quake and tsunami damages in 2009. There is a drainage problem in the low land along the coast in the capital

6) Samoa

Cyclone and high tide occurred frequently. There were earthquake and tsunami damages in 2009.

Kind of disasters that occurred in each country are shown in the table below. There has been no disaster recorded in Nauru, Tuvalu or Palau, since 2000.

Table 2-1 Kinds of Disasters

Country	Cyclone Flood Landslide	Earthquake	Tsunami	Country	Cyclone Flood Landslide	Earthquake	Tsunami
Fiji	○			Nauru			
Solomon	○	○		Tuvalu			
PMG	○	○		Niue	○		
Vanuatu	○	○		Palau			
Tonga	○	○	○	Marshall	○		
Samoa	○	○	○	Micronesi a	○		
Kiribati	○						

Table 2-2 Details of Disasters in the Countries

Fiji								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1997	Cyclone	25						US\$27mil
1999	Cyclone Dani				2,000			F\$2mil
2000	Flood	4	1					
2003	Cyclone Ami	15	4					F\$22mil

Fiji								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
2004	Flash flood Land slide							F\$11.5mil
2007	Land slide	3	1					
2009.1	Flood	7			8,400			F\$330mil
2010.3	Cyclone Thomas	2		8,000	30,000	517houses	1,150houses	F\$12mil

Solomon								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
2002	Cyclone				1,100			
2007	Earthquake Tsunami	52	7		36,600	916		
2009	Flood	21	12		11,000			
2010	Flood	2			600			

PNG								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1998	Tsunami	2,022	500		9,200			
1998	Slope Collapse	76						
2002	Earthquake	1				50		
2002	Land slide	36	11			12		
2002	Earthquake				4,400	520	200	
2003	Land slide	13			21			
2004	Flood				50,000			
2004	Volcanic Eruption	1			9,800			
2005	High Tide				30,700			
2005	Flood Volcanic Eruption				30,000 50,000			
2006	Land slide	13			151			
2006	Flood Land slide				10,000			
2006	Volcanic Eruption				13,300			
2007	Flood	163		13,000	145,000		1,000	
2008	Land				2,000			

PNG								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
	slide							
2008	High Tide				7,800			
2008	Volcanic Eruption				14,600			
2008	Flood				75,300			
2010	Flood				20,000			

Vanuatu								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1997	Earthquake	100						
1999	Cyclone Earthquake	44			14,100			
2001	Cyclone	2			800			
2002	Earthquake				500			US\$2.5mil
2004	Cyclone	2			54,000			US\$6mil
2006	Volcanic Eruption				2,500			

Tonga								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1997	Cyclone				3,000			
1998	Cyclone				3,100			
2001	Cyclone				16,500			
2009	Earthquake Tsunami	9			507			US\$9.5mil

Samoa								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
2004	Cyclone	1						
2005	Cyclone	9						
2009	Tsunami	148			5,600			US\$150mil

Kiribati								
Impacts by climate change. Population concentration and environment deterioration in metropolitan Tarawa south.								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1999	Draught				84,000			
2008	Flood				85			

Niue								
Small population, skilled worker's insufficient and poor communication system.								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1999	Epidemic	1			279			
2000	Cyclone	1			702			

Marshall								
Impact by sea level rise. Rapid increase in population.								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
2000	Epidemic	6			218			
2008	Flood				600			

Micronesia								
Cyclone occurred frequently.								
Year Occurred	Disaster	Dead	Missing	Evacuated	Affected	Properties destroyed	Properties damaged	Damage amount
1998	Draught				28,800			
2000	Epidemic	19			3,400			
2002	Cyclone	47			1,400			US\$0.5mil
2003	Cyclone				1,000			
2004	Cyclone	1			6,000			

2.2 Disaster Management in the Countries

2.2.1 Fiji

(1) Policy, Administration and Organization

1) Current Situation

NDMA: National Disaster Management Act was stipulated on 1998. National Disaster Risk Management Plan was prepared in 1995. The Plan was revised in 2006 and National Disaster Management Plan was prepared.

Based on the act, nation's administration against natural disasters is organized from national to community level as shown in the figure below. National Disaster Management Council (NDMC) is composed of secretary generals of ministries and is responsible for policy making of disaster management. Following three sub-committees are established in the council.

- a) Mitigation and Prevention Committee : coordinates activities on disaster reduction
- b) Preparedness Committee : promotes awareness in communities
- c) Emergency Committee : conducts coordination in case of emergency

Disaster councils are established in the divisions and districts. Officials of the ministries assigned to the local offices are nominated as members of the councils in divisions and districts. National Disaster Management Office (NDMO) coordinates activities of various organizations related with disaster management.



Figure 2-1 Administrative Chart of Disaster Management on National Level, Fiji

In case the disaster occurs, NDMO functions as implementation organization of disaster management. National SOP (Standard Operation Procedure) for cyclone, tsunami, and flood were prepared in 2011. Supporting Plans were also prepared for cyclone and tsunami. Some of the divisions and districts have prepared disaster management plan.

Ministry of Agriculture has the standard design manual on river structures related with agricultural activities such as irrigation intakes. However, there is no standard design manual on structures for flood control. There is no structure constructed for flood control. There is no act/regulation on land use control for disaster reduction.

Activities for disaster management are assigned to the organization tabulate below. The main activities are concentrated to emergency response. The activities for preparedness have been insufficient.

Table 2-3 Organizations Responsible for Disaster Management, Fiji

Kind of Disaster	Preparedness	Immediate Response	Rehabilitation, Reconstruction
Earthquake Tsunami	MRD	NDMO, MRD	Ministry of Provincial Development and National Disaster Management
Cyclone, Flood	Hydro. Section(FWA)	NDMO Hydro. Section(FWA)	do
Landslide	NDMO	NDMO	do

2) Problems and Issues

- a) Activities are concentrated on response and rehabilitation. More work should be devoted for preparedness.
- b) In divisions and districts, SOP has not been prepared.
- c) There is no standard design manual on flood control structures, nor regulation on land use control for the purpose of disaster reduction.

3) Proposed Assistance

Table 2-4 Proposed Assistance for Administration and Organizations, Fiji

No.	Proposed Assistance	Items with Priority
1	Strengthening capacity for preparedness	Promotion for awareness in communities Disaster education in schools
2	SOP preparation in divisions and districts	Understanding of hazards, and importance of preparedness SOP preparation
3	Land use control	Conservation of water holding capacity of basins Land use control in flood prone areas

(2) The Organization Responsible for Disaster Management

National Disaster Management Office(NDMO), Ministry of Provincial Development and National Disaster Management

National Disaster Management Office (NDMO), Ministry of Provincial Development and National Disaster Management is responsible for disaster management.

1) Current Situation

NDMO is composed of three units.

Table 2-5 Outline of NDMO, Fiji

Number of staff	14
Annual Budget	F\$1mil (¥47mil)
Units	① Emergency, Planning & Coordination ② Training, Education & Awareness ③ Risk Management & Policy Research

F\$1mil (¥47mil) was prepared for Trust Fund for Relief and Rehabilitation in addition to the regular annual budget, last year. The regular annual budget is just enough for administration activities, and not for implementation of projects. In the NDMO building, Disaster Management Operation Center (DMOC) is set up during disaster occurrence. NDC members and NDMO staff collaborate as the head-quarter for immediate response and rehabilitation by 24 hours shift. The system functions properly. However, the system is not digitalized at all. All the information is manually written on the white board. The national map is made of plastic hang on the wall. The response is processed as follow:

- a) The head of the local administration of the site proclaims emergency occurrence.
- b) Operation center is established at NDMO. Relevant organizations assign coordinating staffs to the center.
- c) Activities at the site is conducted through the assigned staffs to DMOC. Necessary information is given to the local administration through the DMOC staffs.

NDMO receives cyclone information from Meteorological Service, and earthquake/tsunami information from Seismology Section, Mineral Resources Dept.. NDMO transfers the information to media and relevant organizations. For communication tools, government telephones, hand phones and e-mail are used. In case of tsunami, there are problems that time is lost during decision making process and that method for immediate transmission of information has not been establishes. Emergency use of SMS for tsunami warning is now under preparation.

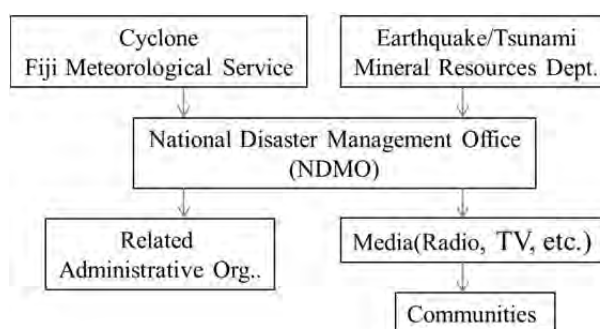


Figure 2-2 Transmission of Disaster Information, Fiji

2) Problems and Issues

- a) All the disaster information is concentrated at NDMO, and NDMO issues warning to communities through media. In this system, necessary time for evacuation/preparation cannot be secured in case of urgency such as tsunami,

- b) Information system for issuing warning to communities has not been established.
- c) In emergency response, sufficient activities have been performed. On the other hand, in preparation, there are items to be done such as making of SOP and preparing countermeasures against flood/landslide.
- d) Strengthening awareness and preparedness in communities is needed.

3) Proposed Assistance

Framework of activities has been established. Capacity development of the staffs and promotion of awareness in communities is needed.

Table 2-6 Proposed Assistance for Disaster Management, Fiji

No.	Proposed Assistance	Items with Priorities
1	Capacity development	① Capacity development in preparedness ② Capacity development of staffs: training in Japan will be effective
2	Improvement of communication system	① Responsibility for administration in introducing effective communication system
3	Promotion of awareness and preparedness in communities	① Promotion of disaster education in schools ② Dissemination of on-going JICA's project on community disaster reduction in communities

(3) The Organization Responsible for Emergency and Rehabilitation

National Fire Authority

The National Fire Authority (NFA) is responsible for the rescue activities at the time of disaster occurrence and the cleaning work after flood.

1) Current Situation

NFA consists of finance and Administrative section, Operation section, and Support Service Section. Operation Section is responsible for rescue activities. NFA has three local divisions such as northern, western, and center/eastern divisions. Fire stations are located at Labasa / Savusavu / Valelevu in the Northern Division, Lautoka, Ba, Nadi / Sigatoka in the Western Division, and Suva / Nausari in in the Central/Eastern Division.

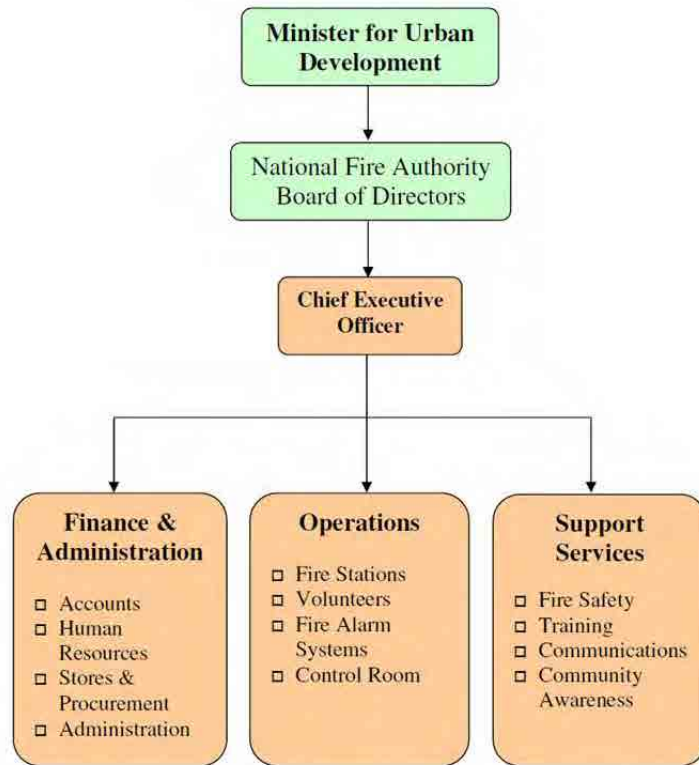


Figure 2-3 Organizational Chart of National Fire Authority, Fiji

There are 305 staffs in total with 97 firefighting volunteers.

Table 2-7 Outline of National Fire Authority, Fiji

Number of Staffs in Total	305 staffs
Number of Staffs for each Section	1) Finance & Administration: 22 2) Operations: 264 3) Support Services: 9

The activities of NFA in an emergency are summarized as follows.

- a) Through assistance staff from NFA, communications and contacts between NDMO and NFA are performed by using fixed-line telephones, e-mail, radio and cellular phones.
- b) Disaster information is reported from the activity sites and four radio broadcast stations.
- c) Neither disaster prevention educations nor evacuation drills are performed as routine work, although NFA staffs may participate as lecturers.
- d) NFA dispatches assistant staff, when an operation center is established by NDMO.

2) Problems and Issues

Problems and issues in rescue activities by NFA are shown as follows.

- a) Equipment and materials such as fire trucks, rubber boats, boats with an engine, wet suits, etc. are short for lifesaving activities.
- b) Budget for SOP on tsunami disaster is insufficient.
- c) Budget for training of volunteers is also insufficient.

In addition, the assistance from other donors (AusAID, NZAP, and Red Cross) is mainly for supply of consumable goods such as blankets and medical drugs. Japan is a major donor for equipment provision and technical training.

3) Proposed Assistance

Based on the current situation, problems and issues, proposed assistance for rescue activities is shown below.

Table 2-8 Proposed Assistance for Rescue Activities, Fiji

Proposed Assistance	Items with Priority
Rescue Activities	Advice & instruction on strategy of NFA
	Instruction & education for the first aid
	Supply of equipment and materials such as fire trucks, lifeboats, rubber boats, wet suits
	Supply of medicines, tents and blankets

(4) The Organization Responsible for Meteorological Observation and Forecasting

Meteorological Service (FMS), Ministry of Works, Transport and Public Utilities

Meteorological Service (FMS), Ministry of Works, Transport and Public Utilities is responsible for meteorological observation and forecasting.

1) Current Situation

Facilities and Equipment of FMS were provided by Japan's Grant Aid. FMS is the Regional Specialized Meteorological Center (RSMC) in Region V assigned by World Meteorological Organization (WMO). In addition to the weather forecasting of the entire region, FMS has played the role of a training center of this region.

Table 2-9 Outline of FMS, Fiji

Numbers of Staff	93
Annual Budget	Approx. 4.6 million FD (Approx. 2.3 billion yen, 2011)
Fiscal Year	January-December
Application Deadline of Annual Budget for Next Fiscal Year	June
Organization	
Forecast	38
Observation/Equipment	21
Climate	9
Communication	4
Operation & Maintenance	4
Others	17
Head Office	Nadi
Observation System	3 shifts (24hours)
Forecasting System	3 shifts (24hours)
Development Plan	Strategic Work Force Plan
Adaption Plan for Climate Change	Climate Change The Fiji Islands Response 2005
Manned Synoptic Station	9 (Data Acquisition: Every 3 hours)
Automatic Weather System (AWS)	14 (Date Acquisition: Every 10 minutes to 3 hours)
Automated Weather Observing System (AWOS)	2: Nadi, Suva
Upper Air Observation	1: Nadi (Pilot Balloon Observation)

Transmitting Method of Observed Data to Head Office	Wireless Communication, Satellite Communication, Telephone Link, Mobile-phone Link etc.
Forecast	Daily Weather Forecast, Marine Weather Forecast, Weekly Weather Forecast, Tropical Cyclone Forecast (3 days forecast/Projected Path), etc.
Distribution of Weather Information	Website, Fax, E-mail, GTS, AFTN, etc.
GTS	Connection with Melbourne by the dedicated line (TCP/IP, 64/16kbps)
Collection Method of Other Forecasts/Warnings	EMWIN, ISCS
Others	3 Meteorological Radar Systems
Note	
Roles in the Pacific	1. Regional Specialized Meteorological Center: RSMC 2. Tropical Cyclone Warning Center: TCWC 3. Tropical Cyclone Advisory Center for Aviation

GTS: Global Telecommunication System

2) Problems and Issues

Current problems and issues of FMS are indicated in the following table.

Table 2-10 Problems and Issues of FMS, Fiji

Field	Problems and Issues			Details
	Law/ Organization	Technology		
		Soft	Hard	
Observation	✓		✓	Since the deteriorated observation equipment cannot be replaced due to lack of finance, it is harmful to observation activity.
	✓			Since the deteriorated calibration instrument cannot be replaced, the accuracy of observed data is influenced.
			✓	Storm surge forecast is not available due to no tidal gauge.
Communication			✓	Dedicated link of telecommunication company is frequently disconnected during tropical cyclones and floods.
Analysis			✓	Deteriorated network equipment and cables influence smooth data exchange in FMS Head Office.
Forecast				-
Distribution of Information				-
Others	✓		✓	Expansion of the training facility in FMS Head Office is required in order to conduct technical trainings for the Pacific countries and FMS facility tours for students.
			✓	Storage for the observed data (paper-based) is insufficient.
	✓	✓	✓	Manpower and equipment to transfer from paper-based data to electronic data are insufficient.

3) Proposed Assistance

Based on the present conditions and the problems mentioned above, the following cooperation programmes are suggested in the field of weather observation and forecasting in Fiji. The important issues are to conduct the upper air observation by using a wind profiler, to expand the training center for playing a role as the Regional Special Meteorological Center and to grant relevant equipment for the calibration work of the observation.

Table 2-11 Proposed Assistance for Meteorological Observation and Forecasting, Fiji

No	Proposed Assistance	Items with Priority
1	Strengthening of Meteorological Observation System (Provision of Equipment)	Airport Weather Observation System
		Wind Profiler
		Meteorological Data Management System
		Meteorological Data Satellite Communication Equipment
		Sea Level Monitoring System
		Others
		Expansion of training room
2	Capacity Building of Meteorological Observation and Forecasting (Technical Cooperation)	Reconstruction of Calibration Center
		Equipment Operation and Maintenance
		Data Quality Control
		Weather Information Dissemination
		Weather Forecasting

(5) The Organization Responsible for Earthquake and Tsunami Observation

Mineral Resources Department (MRD), Ministry of Land and Mineral Resources (MLMR)

Mineral Resources Department (MRD), Ministry of Land and Mineral Resources (MLMR) is responsible for observation and warning of earthquake and tsunami in Fiji.

1) Current Situation

Seismology Section, which monitors earthquake and tsunami, collects and analyses information, gives an alarm, and maintains special machines/equipment by limited number of staffs. Two of staffs had received training in Japan and play a role at a position with responsibility.

Table below shows current situation of Mineral Resources Department.

Table 2-12 Outline of MRD, Fiji

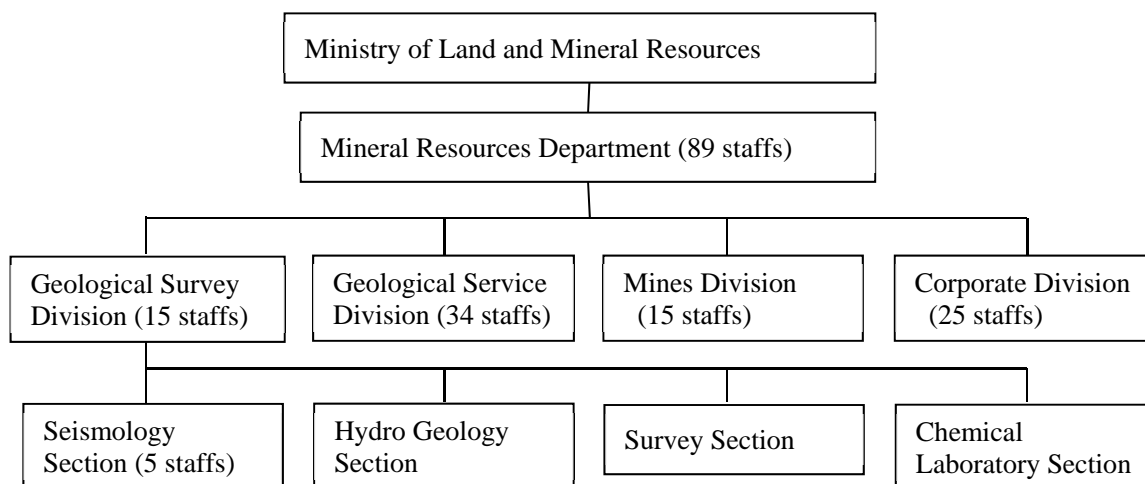
Number of Staff	5
Annual Budget	F\$ 0.8mil (¥. 37.6mill, 2011)
Organization	Ministry of Lands and Mineral Resources (MLMR) , Mineral Resources Department, Geological Survey Division, Seismology Section
Head Office	Suva
Observation System	Single shift (08:00~16:00)
Adaptation Plan for Earthquake Mitigation	Nil
Monitoring Station	9 (6 of 9 stations are shared with Tonga)
Type of Seismograph	3: Analogue (1second) 、 6: Digital broadband
Transmitting Method of Observation Data to Head Office	3: Analogue VHS network, 6: VSAT
Criteria for Intensity of Earthquake	Applied Level 1~Level 7
EMWIN	Nil
GTS Network	Nil
Distribution of Earthquake Information	Connection with NDMO by the dedicated line
Collection Method of Other Forecasts/Warnings	CISN: California Integrate Seismograph Network (Information of epicenter and intensity of earthquake)

There are 9 monitoring stations in Fiji. The information of the 6 out of the 9 is shared with Tonga. The information monitored at 5 stations in Tonga is also shared with Fiji. In addition to the information monitored at the 14 stations through Fiji and Tonga network in total, MRD obtains information from PTWC through California Integrate Seismograph Network (CISN).

The seismic network jointly operated by Tonga and Fiji was developed by JICA's technical cooperation project which completed in 2011. Data on earthquake at each observation points are sent in real time to MRD head office through satellite communication system. Epicenter and seismic strength can be shown within three to five minutes after earthquake occurrence.

Result of analysis done by MRD is sent to NDMO through a dedicated telephone line. NDMO has a role to transmit warning on earthquake and tsunami to media and authorities concerned, which MRD is not responsible for.

Figure below shows organization of the MRD and number of staffs in the divisions and sections as of January, 2012.



Source: MRD, As of January 2012

Figure 2-4 Organizational Chart of MRD and MLMR, Fiji



Figure 2-5 Monitoring Equipment for Earthquake of MRD, Fiji

2) Problems and Issues

Accuracy of location of epicenter and strength identified by the network is quite good, however, MRD cannot analyze and judge possibility of tsunami caused by earthquake yet. MRD just relies on tsunami forecast from PTWC which it takes 10 ~ 15 minutes to get.

Current problems and issues of MRD, Fiji are summarized in the table below.

Table 2-13 Problems and Issues of MRD, Fiji

Field	Problems and Issues			Details
	Law/ Organization	Technology		
		Soft	Hard	
Observation			✓	Frequently occurred Trouble of equipment
		✓		Lack of maintenance technology for equipment
	✓			Monitoring of earthquake is not operating 24 hours (only in the daytime) caused by shortage of staff and budget. It is serious situation to issuance early warning during non-operation time.
Communication			✓	Necessity of alternative communication network lines to receive earthquake information from outside of the countries (weakness of back-up communication line especially victims happened)
Analysis			✓	Cannot analyze and judge possibility of tsunami caused by earthquake yet
Forecaster	✓			Indirect warning system to make delay of evacuation (earthquake noticed to people via NDMO)
Distribution of Information	✓			Shortage of staff to affect operation and maintenance

3) Proposed Assistance

Table below shows proposed assistance for earthquake and tsunami monitoring .

Table 2-14 Proposed Assistance for Earthquake / Tsunami Monitoring, Fiji

No	Proposed Assistance	Items with Priority	
1	Strengthening of Earthquake Monitoring Network	Earthquake monitoring equipment	
		Earthquake analysis system	
		Earthquake data management system	
		Equipment for communication system of earthquake monitoring network	
		Message switch of GTS / Equipment of data transfer	
		Backup power generator	
		Tide level gauges for monitoring tsunami	
2	Technical Cooperation for Capacity Development on Earthquake Monitoring	Operation / Maintenance	Formulation of operation and maintenance manuals for equipment
			Formulation of inventory/registration book for equipment
			Formulation of technical specifications and procurements including spare parts list
			Training of technical staff for maintenance, find the cause, improvement and recovery
			Procurement and calibration of monitoring equipment
		Monitoring / Analysis	Training for minimize the notice time and improvement of accuracy
			Training of communication technology for easy to understand notice to the public
			Training for filing technology of data archive

(6) The Organizations Responsible for Cyclone, Flood and Landslide

(6-1) Hydrological Section, Water Authority of Fiji (WAF)

The hydrological section under the Water Authority of Fiji (WAF) is an organization which is carrying out hydrological monitoring of rainfall and river water level. WAF provides Fiji Metrological Service (FMS) and NDMO with the monitored data.

1) Current Situation

Although the Hydrological Section had been under direct control of Ministry of Public Works (MPW), it was transferred to WAF in 2010. WAF is a statutory body affiliated with the Ministry of Works, Transports and Public Utilities (MTPU). As shown in the following table, there are 12 officers at Central/Eastern Division in Wailoku, eight 8 officers at Western Division in Lautoka and six 6 officers at Northern Division in Labasa. At the time of flood occurrence, the officers are in charge of the work of monitoring and forecasting the water level in the river for 24 hours. In addition, there are support staffs for maintenance and operation of the monitoring equipment.

As for responsibility of division, central and eastern division is responsible for central part and eastern part, western division is responsible for west part in Viti Levu Island, and northern division is responsible for northern part in Viti Levu Island and Vanua Island.

Table 2-15 Outline of Hydrological Section, WAF, MTPU, Fiji

Higher Organization	Ministry of Works, Transports, and Public Utilities
Total Officers	26
Budget	F\$ 2.2mil
Division	Central & Eastern at Wailaku: 12 Western at Lautoka: 8 Northern at Labasa: 8
Location of Headquarters	Wailaku
Rain gauge Station	110 stations
Water Level Station	87stations
Regular Interval of Monitoring	Every 15 minutes

The flood forecasting and warning system (FFWS) equipped with the telemeter with solar panels and storage batteries is installed in five basins by the assistance of Japan, New Zealand's Institute of Water and Atmosphere Research (NIWA) and EU. The system assisted by JICA is installed in Ba River basin, Sigatoka river basin, and Labasa river basin.

Hydrological section of WAF has a role which carries out the water level monitoring and river water level forecasting during flood in main rivers. The recorded period for hydrological data reaches mostly from 20 to 80 years. The longest recorded period reaches at about 100 years.

Monitored data of rainfall and water level is input and recorded to the computer in the hydrological section of WAF. The hydrological section of WAF offers monitoring data at the request of the users who need these data for various kinds of studies and researches on water resources development plan, hydropower generation plan, etc. During flood, all the forecasted results for water level for each river are transmitted to NDMO.

NIWA performs technical support and staff training on flood forecasting and warning system in Rewa and Navua River. The forecasting water level is performed within about 30 minutes from the time data is accepted. The forecasting range (leading time) is set to be 6-hours in Rewa River and 2 or 3-hours in Navua River, Nadi River, and Labasa River.

Flood forecasting and warning system (FFWS) will be introduced in Singatoka River in near future. If monitoring accuracy improves by increasing number of rain gauge stations and the time for gathering information becomes shorter by the improvement of an information gathering interface etc. , forecast and warning will be conducted in shorter time.

2) Problems and Issues

Problems and issues are shown as follows.

a) Compatibility of monitoring equipment

Since there is no compatibility among the observation equipment assisted by JICA and NIWA, the cost for operation and maintenance arises doubly.

b) Improvement of the system in community based disaster prevention

Although local residents are utilizing the simple rain gauges and staff gauges for disaster prevention which were installed by community based disaster prevention project by JICA, benefits are limited to the local areas. If warning system and monitoring system are interlocked, it can be benefit in the whole basin. For this reason, WAF plans the cooperation with the on-going community based disaster prevention project for improvement in FFWS in Ba River basin.

c) Shortening of time for forecasting

At present, the time for analysis and forecasting is too long. It is necessary to shorten the time by introducing a new system (interface improvement) and network improvement.

(6-2) Department of Agriculture, Ministry of Primary Industries

1) Current Situation

The Land and Water Resources Management Division(LWRD) in the Department of Agriculture (DOA) under the Ministry of Primary Industries (MOPI) carries out the prevention measures against flood and development for water resources as a part of agricultural policy. The LWRD is responsible for flood risk mitigation, effective drainage and mitigate drought impacts as a part of water resources management. The minister deals with implementation plan on river improvement, coastal erosion prevention and integrated water resources management.

2) Problems and Issues

The countermeasures against flood done by LWRM is for the purpose of agricultural use such as water intake construction, and is not for flood prevention.

(6-3) Proposed Assistance

Based on the current situation and issues, proposed assistance for cyclone, flood and landslide are shown as follows.

1) Warning System Improvement

Since the budget scale is small to improve the warning system on the national for the moment, warning system at the community level shall be improved.

The simple alarm system using the water level gauges installed by the JICA project in Ba River has no forecasting function. When the flood occurred in January, 2012, residents have perceived danger of flood from the rate of rising river water level by monitoring water level gauges, took refuge before flood coming, and escaped from damage. The water level gauges were handmade and installed by local residents. A simple alarm system like this makes the maintenance by residents possible.

2) Hazard Risk Map Preparation and Education for Disaster Prevention

Hazard areas are acknowledged to the communities, and the preparedness for flood is strengthened. Awareness of the residents is promoted by participating in investigation of risks of the areas by themselves. In addition, the disaster education and evacuation drills area taken into school programme. The on-going community based DRR project is applied to other parts of Fiji and other countries of the Region through evaluation.

3) Notification of Hazard Areas and Land Use Control

Progress of urbanization is remarkable and the disaster risk is increasing by concentration of the population in the low-lying areas. The land use in the places where flood occurs frequently is to be regulated legally for the measures against floods..

Hazard areas are specified in a hazard map and relocation of illegal occupants is needed. To solve these issues, the Integrated Water Resource Management (IWRM) or Integrated Flood Management (IFM) project should be carried out.

As mentioned above, proposed assistance including hydrological monitoring and analysis are shown in the table below.

Table 2-16 Proposed Assistance for Cyclone, Flood and Landslide, Fiji

No.	Proposed Assistance	Items with Priority
1	Capacity Building for Community Based Disaster Prevention	Introduction of simple warning system
		Capacity building for community based disaster prevention at division level
2	Preparation of Hazard Maps	Identification for hazard areas and evacuation places
		Preparation of hazard map
3	IWRM & IFM	1) Land use survey 2) Study for runoff ratio 3) Proposal for IWRM 4) IFM in low-lying areas
4	Improvement of FFWS	Review for monitoring system , flood forecasting and evacuation plan

		Improvement plan for monitoring system , flood forecasting and evacuation plan (selected one (1) or two(2) rivers)
5	Strengthen hydrological monitoring system in the river	Improvement for rain gauge and water level stations
		Monitoring during flood and use of the data for warning

(7) Information and Communication System

1) Current Situation

Communication and Cooperation between related agencies / organization seem working well. However, communication between major departments depends on landlines which are often disconnected in a time of disaster. Fiji's information / communication system is based on fragile infrastructure.

Currently, NDMO consolidates all of advance notice and warnings. It assesses the needs of information to be notified to the public. It disseminates information to the public through media, and local government. During the process, demarcation among participating agencies (Meteorological Service, MRD and Hydrological Section) is clear. Every agency is connected by Govnet which has been installed by ITC team in MOF (Ministry of Finance).

2) Problems and Issues

During state of emergency, information sharing system is operated on fragile infrastructure. There is major risk of losing connection. Previously, each institute had a channel to media to express their warning. Currently, information is integrated at NDMO and transmission is unified. At the same time, warning has lost rapidness. Therefore, tsunami warning has lost function in its rapidness.

Table 2-17 Problems and Issues in Information / Communication System, Fiji

Area	Problem and Issues			
	Law & Framework	Technical		Detail
		Soft	Hard	
Information Sharing System			✓	Major communication lines are rely on landlines. Therefore institutes placed on remote area (suburb of Suva city, Nadi) have major risk to lose their connection.
			✓	MRD has no generator. MRD office is fragile to disaster.
		✓	✓	Information gathering and transmission are done manually. So, there is plenty of space for increasing efficiency.
Emergency Warning System		✓		NDMO is utilizing SMS service for warnings. However, there is no Guidelines and MOU. It requires talks between NDMO executives and Telecom Company's executives.
	✓			NDMO consolidated channels for media and promote unification of information. However, tsunami warnings probably lost its function since its rapidness cannot be secured.

3) Proposed Assistance

For countermeasures of the issues above, following assistance is proposed.

Table 2-18 Proposed Assistance for Information / Communication System, Fiji

No	Proposed Assistance	Items with Priority
1	Capacity Building for Sharing Information	Upgrade of communication infrastructure between participating institutes
		Development of urgent information sharing system
		Upgrade disaster proof of each institution
		Develop information sharing network between participating institutes and media

(8) Other Organizations

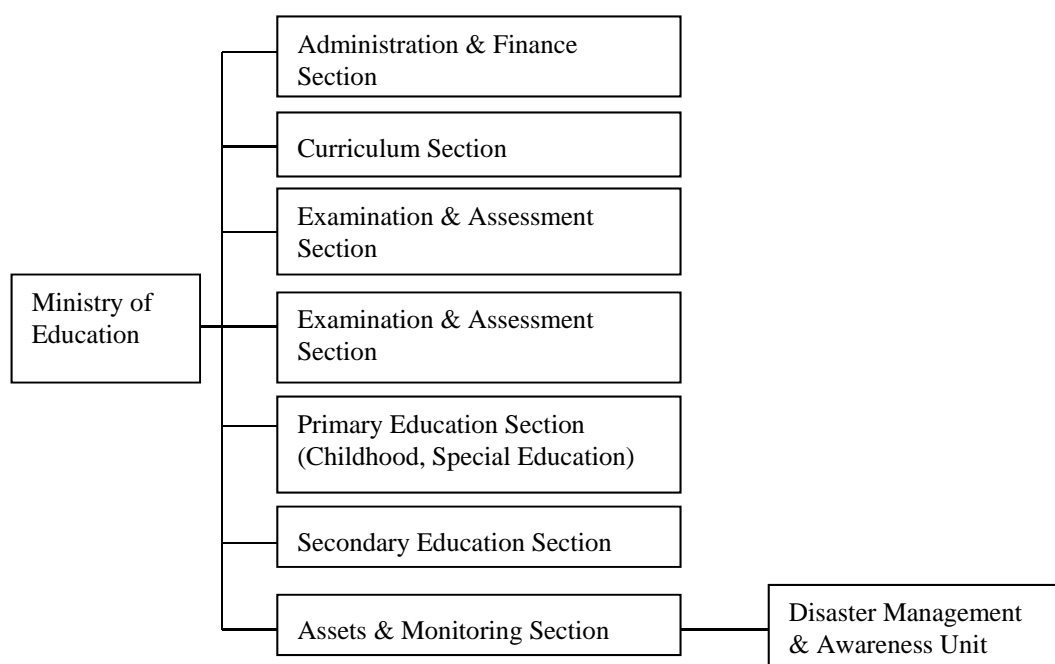
(8-1) Ministry of Education (MOE)

1) Current Situation

Ministry of Education (MOE) has about 10,000 teachers and staff. About 300 work at MOE head office. MOE divides Fiji into four (Central, North, East and West) Divisions for management. Each of Central, North, East and West Division has 2 districts, 2 districts, 1 district and 4 districts respectively.

There are 735 primary schools (8 years, Class 1 ~ 8) and 169 secondary schools (5 years, form 3 ~ 7) in Fiji. 98% of total 904 schools are known as community schools. The facilities of the community schools, including accommodation buildings for staffs are constructed by grant from local people. To the community schools, MOE only dispatches teachers and pays their salary. The remaining 2% (14 schools) are government schools.

Figure below shows the organization of MOE.



Source: MOE, As of January 2012

Figure 2-6 Organizational Chart of MOE, Fiji

Assets and Monitoring Section is divided into two teams (School Community Emergency Assets and School Infrastructure Emergency Assets) when Emergency in Education (EIE) occurs. School

Community Emergency Assets Team tries to grasp human damage and School Infrastructure Emergency Assets Team tries to grasp property damage such as school facilities. After grasping both damages, two emergency assets teams in cooperation with agencies concerned develop countermeasures immediately. Assets and Monitoring Section coordinates support activities of donors who participate in repairing activity of school facilities and in support activity to students for commuting to schools.

Assets and Monitoring Section also establishes curriculum for education; prepares educational tools and programs & conducts activities to raise awareness on disaster prevention. As concrete action on education for disaster prevention, Assets and Monitoring Section prepares following tutorial manuals in cooperation with NDMO and others. Almost all disasters (earthquake, tsunami, cyclone, flood, land slide and fire) are included in the target for education on disaster prevention.

- a. Disaster Management Plan (DMP) – Basic Plan on Disaster Management
[Teacher’s Handbook: Disaster Management and Earthquake Preparedness/NDMO funded by UNCRD and Japan]
- b. Emergency Evacuation Plan (EEP) – Implementation of emergency drill in line with this plan
 - ① A Guide to Creating Evacuation Plans for Schools in the Fiji Islands
 - ② Combined Schools and Education Houses Tsunami Evacuation Mock Drill Operation Brief
- c. Standard Operation Procedure (SOP) – Manual for operation after disaster
(Students Workbook on Disaster Management has been prepared for students)

Evacuation drill of tsunami had been implemented in line with above b ① at two schools located along coast by coordination of SOPAC in 2011. Other than NDMO/SOPAC, international organizations such as UNICEF, UNOCHA, Red Cross, NGOs had cooperated in implementation of the drill. MRD assumed scale of earthquake and tsunami as follows. A) Earthquake with magnitude 8.9 occurs in the seas near Suva. B) Tsunami with 10m in height hits coastal area because of an earthquake.

SOPAC prepared a hazard map showing flooded area by tsunami and routes and places for evacuation in Suva based on assumption. Evacuation drill had been implemented based on the map. Education program on disaster prevention mentioned above is included in Annual Corporate Plan officially.

2) Problems and Issues

MOE has following issue on emergency evacuation. Software for disaster prevention is now being developed. However, no hardware such as permanent facility for Emergency Operation Center (EOC) to manage information and command at emergency situation has been prepared yet. A conference room in MOE is used for EOC temporally at present. The photo below shows situation of a meeting for flood and land slide occurred at north area in Fiji. Disasters which MOE has to handle occur every year. Once a disaster occurs, protection of pupils and students and opening of schools as evacuation facilities are needed. MOE wants support for preparation of a permanent EOC equipped with communication tools for emergency in a strong building that is also functional for storing

drinking water, emergency electric facility, medicine, blanket, emergency foods as well. Two staffs from Assets & Monitoring Section had training for 5 weeks in December 2010 in Japan. Lots of things on disaster prevention could be learnt from the training in Japan. This training triggered for strengthening education on DRR.



Figure 2-7 Meeting Room in MOE: Temporarily used for Emergency Operation Center for Flood and Landslide at Northern Viti Levu Is.

3) Proposed Assistance

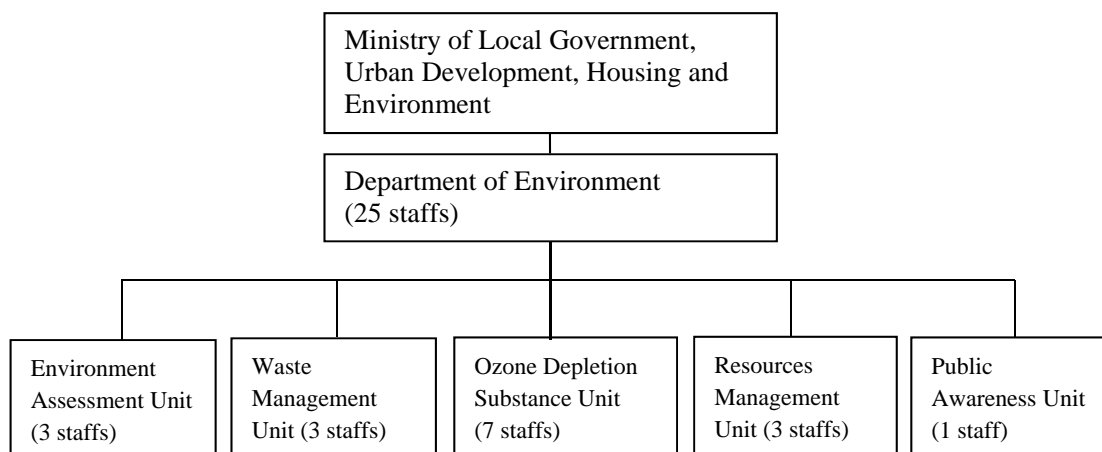
Table 2-19 Proposed Assistance for MOE, Fiji

Proposed Assistance	Items with Priority
Education Programme for Disaster Prevention	Formulation of lecture materials
	Preparedness for SOP
	Capacity development for teachers and government officers on DRR

(8-2) Department of Environment , Ministry of Local Government, Urban Development, Housing and Environment

1) Current Situation

Department of Environment (DOE), which is the department under Ministry of Local Government, Urban Development, Housing and Environment (MLUHE), works for prevention of natural disaster from view point of protection and management of environment. The figure below shows an organization chart of DOE.



Source: Department of Environment, As of January 2012

Figure 2-8 Organization and Number of Staffs in DOE, Fiji

Climate Change Unit, which is organized under Ministry of Foreign Affairs, works for issue of global warming together with DOE.

Environment Management Act (2005), which has been stipulated under Environment Law, has been provided as a guideline for protection of environment and prevention of natural disaster. DOE works for issues of urban drainage and solid waste management based on the Act.

Environmental Impact Assessment (EIA) including geology, fauna and flora is requested according to the Act to developers and/or owners who want to develop land and construct buildings in areas including slopes with the risks of landslide. DOE judges degree of impact to environment based on the results of EIA.

Following four organizations are related with land-use which management of good environment and development of a safety nation. Many organizations including DOE concerned to environmental protection and disaster management divide their roles at present. Therefore, coordination is not easy

- 1) Land Department / Ministry of Land,
- 2) Town Planning Department / MLUHE
- 3) Ministry of Health
- 4) National Land Trust Board (independent entity)

For earthquake countermeasures for buildings. Seismic Resistant Code in National Building Code which is managed by Ministry of Health is provided. However, this code has been applied to buildings constructed mainly in urban areas, and not in rural areas. Prevention of coastal erosion is also needed. Plantation of mangrove trees and construction of breakwater is under discussion.

2) Problems and Issues

Development is not well controlled because of its fast progresses. Disasters such as flood and land slide have occurred in rural areas. It seems that there is a big difference on administrative direction

between urban areas and rural areas. Therefore, to filling the gap is an urgent issue for protection of people from disasters.

2.2.2 Solomon

(1) Policy, Administration and Organizations

1) Current Situation

National Disaster Act and National Disaster Council Act were stipulated on 1989. National Disaster Plan was prepared on 1980, and 2010 version has been used. Based on the National Disaster Council Act, National Disaster Council (NDC) was established, under which provincial disaster councils are instituted, forming a disaster management system in national level. Based on the National Disaster Plan, there are four sub-committees, for preparedness, forecasting/warning, rehabilitation, and reconstruction, under NDC. As a coordinating office of NDC, National Disaster Management Office (NDMO) exists.



Figure 2-9 Administrative Chart of Disaster Management on National Level, Solomon

During disaster occurrence, National Disaster Operation Committee (N-DOC) is established and emergency management is conducted with National Emergency Operation Center

(NEOC) as the headquarter. Under N-DOC, five clusters, in the field of welfare, livelihood, initial response and assessment, public service, and infrastructure, are set up, with logistics support, and NEOC management unit. Information from the sites to NEOC and commandment from NEOC to the sites flows along the lines in the figure below. SOP for each of the clusters have been prepared, however, SOP for each of the element organization of the clusters are still under preparation.

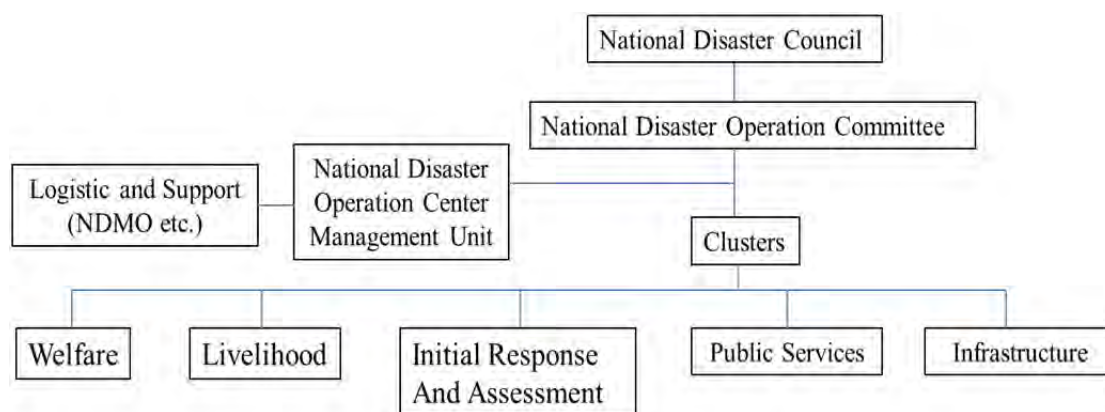


Figure 2-10 Organizational Chart of Clusters during Disasters, Solomon

Regarding standard design manuals, there is none for flood control structures. River structures have never been constructed. There is no building code for earthquakes. Existing land use regulation can be applied only to government owed properties. Land use control for disaster risk reduction on private lands is not conducted.

Activities for disaster management are assigned to the organizations shown below

Table 2-20 Organizations Responsible for Disaster Management, Solomon

Kind of Disaster	Preparedness	Immediate Response	Rehabilitation Reconstruction
Earthquake Tsunami	Geology Div.	NDMO, Organizations responsible for the properties/areas	NDMO, Organizations responsible for the properties/areas
Cyclone, Flood	Ministry of Infra. And Development	do	do
Landslide	Organizations responsible for the properties/areas 被	do	do

2) Problems and Issues

Urgent issues are as follow.

- a) In element organizations of the clusters, SOP has not been prepared.
- b) In the local administration, SOP has not been prepared.

3) Proposed Assistance

Proposed assistance is summarized as follow.

Table 2-21 Proposed Assistance for Administration and Organizations, Solomon

No.	Proposed Assistance	Items with Priority
1	SOP preparation in in each of element organization of clusters	Clarify responsibility of each organization and flow lines of commandment
2	SOP preparation in each of provincial governments and communities.	Awareness of hazards and dissemination of knowledge on preparedness

(2) The Organization Responsible for Disaster Management

**National Disaster Management Office (NDMO), Ministry of Environment, Climate Change,
Disaster Management and Meteorology**

National Disaster Management Office (NDMO), Ministry of Environment, Climate Change,
Disaster Management and Meteorology is responsible for disaster management.

1) Current Situation

NDMO is composed of 3 units. Among 14 staffs for the Operation Unit, 10 of them are supposed to be assigned to each of 10 local offices. However, 5 of the offices have not been prepared, yet. Therefore, 5 are in provincial offices and the rest of the 9 are in the main office at Honiara. Capacity for disaster management of the staffs is still insufficient. A training staff is assigned to improve this situation.

Table 2-22 Outline of NDMO, Solomon

Number of staffs	18
Organization	1) Risk Reduction Unit: 1 staff (in charge of training) 2) Operation Unit: 14 staffs (10 are to be assigned to each of provincial offices) 3) Cooperate Service: 3 staffs
Place of main office	Honiara
Work shift	Day shift during normal time 24hours shift during disasters
Inter-ministries communication tools	Commercial telephone lines e-mail, and radios (to be procured with Japanese grant)
Warning dissemination Tools	Radios, TVs, newspapers
Tools for availing disaster information	Earthquakes and tsunami: Geology Div. and PTWC with EMWIN Meteorological Information: Meteorological. Div. Flood: Water Resources Div.

During disasters, the disaster management operation center is set up inside NDMO building by 24 hours shift, monitoring the damages and issuing commandment as the headquarter. NDMO avails disaster information from Meteorological Div. on cyclones, from Water Resources Div., MMERE on floods, and from Geology Div., Ministry of Mines Energy & Rural Electrification on earthquakes and tsunami. Information on far-earthquakes and tsunami is availed from PTWC by EMWIN. The information is transmitted to media and relevant organizations. For the communication tools, commercial telephone, lines e-mail and radio broadcast are used. There is no exclusive communication system for government use. Only the tool to disseminate information to the communities is Solomon Islands Broadcasting Cooperation (SIBC). The covered area with short wave and mid wave is about 80% of the nation. On the other hand, regarding hand phones, remote islands and less populated areas are not covered. TV can be watched only in Honiara



Figure 2-11 Transmission of Disaster Information, Solomon

NDMO is also responsible for preparedness. Preparedness is not enough in the communities. To reinforce this weakness, NDMO has purchased SIBC programme time between 17:00-17:30 on Tuesdays and Thursdays, and 6 spots of 60 seconds every morning between 6:00-11:00. NDMO broadcasts disaster education programs through these SIBC broadcast. Assistance from donors towards NDMO is summarized in the table below.

Table 2-23 Foreign Assistance Towards NDMO, Solomon

Name of Project	Years Implemented	Donors	Budget Scale
Building of 3 Provincial Disaster Management Buildings	2010 - 2012	EU, SOPAC	EUR 0.5mil
Project for Strengthening Community-based Disaster Risk Management	2010 - 2013	JICA	US\$ 3.40mil
Project for Improvement of Radio Broadcasting Network for Administration of Disaster Prevention	2010 - 2013	JICA	¥506mil
Capacity Development for Disaster Management in the Pacific		SOPAC	
JOCV Volunteer for NDMO		JICA	Publication

2) Problems and Issues.

Current problems and issues are summarized below.

- a) Enforce local administration by establishing the unfinished provincial offices.
- b) Capacity development of NDMO staffs.
- c) Secure emergency communication by installing exclusive system for government.
- d) Capacity development of communities.

3) Proposed Assistance

Proposed assistance is summarized below

Table 2-24 Proposed Assistance for Disaster Management, Solomon

No.	Proposed Assistance	Items with Priority
1	Enforcement of organizations	1) Enforcement of disaster management capacity in provinces by establishing unfinished 5 NDMO local offices. 2) Capacity development of NDMO staffs: Training in Japan will be effective.
2	Improvement of communication	Procurement of equipment such as antennas for information /communication improvement.
3	Promotion of awareness in communities	1) Promotion of disaster education by media 2) Continuing and extension of the on-going project of JICA on community disaster risk reduction

(3) The Organization Responsible for Meteorological Observation and Forecasting Solomon Islands Meteorology Div. (SMD), Ministry of Climate Change, Disaster Management, and Meteorology (MECDM)

Solomon Islands Meteorology Division (SMD) has six manned meteorological observatories and has conducted weather observation, weather forecast and official announcement of alert and warning (cyclone and tsunami).

1) Current Situation

Head Office of the SMD is located in the building of Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) and conducts mainly weather forecast and official announcement of alert and warning. However, the facility becomes older and its area is insufficient.

Under "Project of Enhancing resilience of communities in Solomon Islands to the adverse effects of climate change in agriculture and food security (2008-2012)" conducted by UNDP, 4 sets of Automatic Weather System (AWS) and twelve rain gauges have been planned to be installed mainly for agricultural use.

Table 2-25 Outline of SMD, Solomon

Numbers of Staff	50
Annual Budget	Approx. SB 5.3 million (Approx. ¥63 mil, 2011)
Umbrella Organization	Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM)
Fiscal Year	January-December
Application Deadline of Annual Budget for Next Fiscal Year	October
Organization	
● Forecast	7
● Observation	34
● Climate	4
● Operation and Maintenance	3
● Others	2
	MECDM, the umbrella organization, is in charge of personnel affairs and accounting.
Head Office	Honiara
Observation System	3 shifts (24hours)
Forecasting System	2 shifts (04:00-12:00, 12:00-18:00) 3 shifts (24hours, In case of severe weather and cyclones)
Adoption Plan for Climate Change	National Adaptation Programme of Action: NAPA (2008)
Manned Synoptic Station	6 (data acquisition: every 3 hours)
Automatic Weather System (AWS)	1: Honiara (data acquisition: every 3 hours)
Automated Weather Observing System (AWOS)	-
Upper Air Observation	1: Honiara (Radiosonde) 1 time/ 2 days (180 times/year, 2011) *Due to lack of finance, the routine observation (1 time/day) is not conducted.
Transmitting Method of Observed Data to Head Office	Wireless Communication (SSB), Telephone Link
Forecast	Daily weather forecast (2 times/day) Weekly weather forecast (2 times/day) Airport weather forecast: (1 time/day)
Distribution of Weather Information	Radio, TV, newspaper
GTS	Disconnected Transmitting: The local observed data is transmitted to overseas through the connection with Wellington by e-mail Receiving : The observed data from overseas cannot be obtained.
Collection Method of Other Forecasts/Warnings	EMWIN : Satellite Data Receiving Equipment LRIT (Low Rate Information Transmission) : MTSAT Receiving Equipment Regional Forecast of Bureau of Meteorology, Australia : internet Regional Forecast from Fiji Regional Specialized Meteorological Center: Internet
Note	
Cooperation with mass media	National Radio Station : 60 seconds/day (weather forecast), 60minutes×2 times/week (meteorological disasters information)
Expansion Plan	- AWS (4) and rain gauge (12) are planned to be installed by UNDP during 2012. - AWOS is planned to be installed at Henderson Airport (Honiara) by New Zealand during 2012.

2) Problems and Issues

Current problems and issues of SMD are indicated in the following table. It is notable that the state of cyclones cannot be grasped quickly and correctly since either upper air observation or ground observation in the southeastern part of the country, which is a birthplace region of cyclones, have not been conducted.

Table 2-26 Problems and Issues of SMD, Solomon

Field	Problems and Issues			
	Law/ Organization	Technology		Technology
		Soft	Hard	
Observation	✓		✓	Since Upper Air Observation equipment (Radiosonde) is not procured due to lack of finance, upper air observation cannot be continuously conducted.
		✓		Since the technical training of manual observation is not conducted, the accuracy of the observed data has problems
Communication			✓	Since SMD has dependency on Internet service of the local provider for obtaining the observed data from overseas, an alternative communication methods considering Internet stoppage in the emergency case is required.
Analysis			✓	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.
Forecast		✓	✓	SMD cannot forecast appropriately due to lack of consecutive upper air observed data, surface observation points and observed data.
Distribution of Information			✓	Since SMD has dependency on Internet Service of the local provider for distributing the observed data to overseas, an alternative communication method considering the Internet stoppage in the emergency case is required.
Others		✓	✓	In order to utilize the broadcast time of national radio station effectively, recording instruments in SMD head office and presentation technique are required.

3) Proposed Assistance

Based on the present conditions and the problems mentioned above, the following assistance is suggested in the field of weather observation and forecasting in Solomon Island.

Table 2-27 Proposed Assistance for Meteorological Observation and Forecasting, Solomon

No	Proposed Assistance	Items with Priority
1	Strengthening of Meteorological Observation System (Provision of Equipment)	Automatic Weather System
		Wind Profiler
		GTS Message Switch
		Meteorological Data Management System
		Meteorological Satellite Data Receiving System
		Forecast Support System
		Early Warning System
		Meteorological Data Analyzing System
		Meteorological Data Satellite Communication Equipment (VSAT)
		Sea Level Monitoring System
		Power Back-Up System
		Others
		Radio program recording studio
2	Capacity Building of Meteorological Observation and	Equipment Operation and Maintenance
		Data Quality Control

	Forecasting (Technical Cooperation)	Weather Information Dissemination
		Weather Forecasting

(4) The Organization Responsible for Earthquake and Tsunami Observation

Seismology Section, Geology Division, Ministry of Mines, Energy and Rural Electrification (MMERE) is responsible for earthquake and tsunami monitoring in Solomon.

1) Current Situation

Seismology Section, Geology Div., Ministry of Mines, Energy and Rural Electrification (MMERE) started earthquake observation with a seismometer provided by USGS since 1961. There are two observatories at Honiara and Savo Island in Solomon. MMERE has 50 staffs and the Geology Div. has only 4 staffs. Earthquake and tsunami information from PTWC is received by SMD, during office hours on daytime. However, the Geology Department is not engaged with the tsunami observation. The operation of earthquake is digitalized and the data is consolidated by computer terminal.

The present situation of Seismology Section Geology Div., is summarized as follows.

Table 2-28 Outline of Seismology Section, Geology Div., Solomon

Number of Staff		4
Annual Budget		Approx. S\$ 72 thousand /2011 (Approx. ¥0.72mil)
Organization		Ministry of Mines, Energy and Rural Electrification (MMERE)
Fiscal Year		January to December
Deadline of Budget Proposal for the Next Year		October
Head Office		Honiara
Observation System		Single shift (8:00-16:00)
Adaptation Plan for Earthquake and Tsunami		Nil
Monitoring Station		Honiara Savo Island (Installed by USGS)
Type of Seismograph		Digital broadband
Transmitting Method of Observation Data to Head Office		Wireless LAN
Distribution of Earthquake Information	Domestic	Use telephone (upon requested by NDMO)
	Foreign Countries	Monitoring data distributed through IRIS (Incorporated Research Institutions for Seismology) to the following international organizations <ul style="list-style-type: none"> • USGS (United State Geological Services, USA) • ISC (International Seismological Center, UK) • NEIC (National Earthquake Information Center, Switzerland) Also, distributed to CTBT (Comprehensive Nuclear Test Ban Treaty) through satellite network
Criteria for Intensity of Earthquake		Not yet established
EMWIN		Nil
GTS Network		Nil
Collection Method of Other Forecast / Warning		Collect information of epicenter and level of earthquake from GFZ (German Research Center for Geosciences) through internet
Scheduled Plan		Additional 1~2 monitoring stations to be installed
Training		Conduct JICA's capacity development project

2) Problems and Issues

The following table summarizes the present issues and problems.

Table 2-29 Problems and Issues of Seismology Section, Geology Div., Solomon

Field	Problems and Issues			
	Law/Organization	Technology		Details
		Soft	Hard	
Observation			✓	Cannot identify the epicenters and intensity by themselves due to few observation stations
		✓		Maintenance of equipment relies on USGS due to a lack of technical capabilities
	✓			Monitoring of earthquake is not operating 24 hours (only in the daytime) caused by shortage of staff and budget. Early warning during non-operation time is possible to be delayed.
Communication			✓	Necessity of alternative communication network lines to receive earthquake information from outside of the countries (weakness of back-up communication line)
Analysis		✓	✓	Cannot analyze and judge possibility of tsunami caused by earthquake
		✓	✓	Lack of technology and facilities for the analysis
Distribution of Information	✓			Indirect warning system will cause delay of evacuation (earthquake noticed to people via NDMO)
Others		✓		Lack of basic knowledge for monitoring earthquake and tsunami. (Currently, just observing seismograph installed by the donor)

3) Proposed Assistance

Table below shows proposed assistance for earthquake and tsunami monitoring.

Table 2-30 Proposed Assistance for Earthquake / Tsunami Monitoring, Solomon

No	Proposed Assistance	Items with Priority	
1	Supply Equipment and Facilities	Earthquake monitoring equipment	
		Earthquake analysis system	
		Earthquake data management system	
		Equipment for communication system of earthquake monitoring network	
		Message switch of GTS / Equipment of data transfer	
		Backup power generator	
2	Technical Assistance / Training	Operation / Maintenance	Formulation of operation and maintenance manuals for equipment
			Formulation of inventory/registration book for equipment
			Formulation of technical specifications and procurements including spare parts list
			Training of technical staff for maintenance, finding the cause, improvement and recovery
			Procurement and calibration of monitoring equipment
	Monitoring / Analysis	Training to minimize the notice time and improvement of accuracy	
		Training of communication technology with communities	
		Training of filing technology for data archive	

(5) The Organizations Responsible for Cyclone, Flood and Landslide

(5-1) Ministry of Infrastructure and Development (MOID)

The Ministry of Infrastructure and Development (MOID) is responsible for improvement of the infrastructures on land transport, waterway traffic, and aviation. Although MOID takes responsibility also for infrastructures in flood mitigation, there is no actual implementation or plan until the year of

2012. The ministry staffs consist of the ten (10) regular officers and external 14 temporary officers. The annual budget of MOID is S\$ 8 million (¥80 mil), with which planning, design, operation and maintenance for transportation are performed.

Table 2-31 Outline of Ministry of Infrastructure and Development, Solomon

Tasks	Maintenance and improvement for the transportation infrastructures, Maintenance of public Buildings,
Number of staves	24
Annual Budget	S\$ 8mil (¥80Mil)
Composition of Budget	10% is the Salomon government budget and 90% is from oversea
Headquarters	Honiara
Local Division	Honiara, Auki, Vonavona
Staff Composition	Regular 10 and External Engineers 14

2) Problems and Issues

The problem and issues of MOID are as follows.

- a) The technical standard of New Zealand is adopted for plan and design on roads, bridges. In assistance projects from foreign countries, the technical standards of the donor countries are applied. From now on, it is necessary to prepare own design standard and criteria in Salomon.
- b) The basic data such as rainfall and river water level for design of cross sections of the bridges, and tidal level for design of sea shore protection facilities in the coastal roads are not available at all.

(5-2) Water Resources Division, Ministry of Mines, Energy, and Rural Electrification

The Water Resources Division (WRD), Ministry of Mineral, Energy, and Rural Electrification (MMERE), is responsible for monitoring the hydrological data such as rainfall and river water level.

The purpose of monitoring is mainly for the hydrological data collection on water supply and hydropower generation project, and is not monitoring for flood prevention project. The number of the officers of the headquarters is seven, and annual budget is about S\$ 0.3mil (¥3 mil).

Table 2-32 Outline of Water Resources Division, Solomon

Tasks	Monitoring and data arrangement for rainfall and river water level
Number of Officers	7 engineers in geology (No local branches)
Annual Budget	S\$ 0.3mil (¥3 mil)
Higher Organization	Ministry of Mines, Energy and Rural Electrification (MMERE)
Composition of Ministry	5 Divisions (Geology, Mines, Water Resources, Rural Electrification, Energy)
Period for Data recorded	Monitoring started in 1967, Recorded data varies for 15 years to 40 years

The fields of the engineers in WRD are in either geology or in hydrogeology. Civil engineering in flood control does not exist. Hydrological monitoring data has been recorded for 40 years or more, and

these data are provided for free of charge if requested from the related organizations.

WRD reports the information on rainfall to NDMO based on the monitoring at the time of cyclone or flood occurrence. However, their knowledge on hydrological information is not sufficient enough. WRD also cooperates with the Ministry of Environment (MOE) about the disaster mitigation program relevant to climate change adaptation. These activities are seldom carried out in fact due to the shortage of the staffs, budget and equipment.

2) Problems and Issues

The problem and issues of WRD are summarized as follows.

- 1) Although WRD carries out data collection for water resources development and hydropower generation plan, maintenance of observation equipment is not done well, and WRD only stores the data without capability for analysis. Neither evaluation of the amount of water resources for water development plan nor hydrological data analysis for hydropower generation is made.
- 2) The fields of the staff in WRD are in geology or in hydrogeology. There is no civil engineer for hydrology/hydraulic analysis and flood control. Therefore, WRD cannot make plan for preparedness or response against flood.
- 3) The WRD recognizes the importance of data analysis based on monitoring, however, sufficient analysis has not been made due to shortage of capability of staff and budget.

Problems and issues on flood control in Solomon are explained as follows.

- a. It is the primary problem that a division responsible for flood control does not exist.
- b. In order to plan structural measures or non-structural measures, specifying damages and analyzing the causes need to be conducted. Capacity development is required through integrations of organizations, and increase of number of river engineers. The identical countermeasures are also required for landslide.

The following improvement plans are proposed for flood control and landslide prevention.

1) Network improvement for rainfall and river water level (Short-term plan)

As a short-term plan, securing staffs for monitoring and analysis of hydrological data is urgently required. Moreover, such condition that the staves of WRD go to local monitoring stations for the collection of data should be improved. Adopting telemetry system or data collection by local staffs of MMERE or contract with NGO are required.

2) Capacity building for processing and storage of hydrological data (Short-term plan)

The WRD requests processing and storage of hydrological data for archive to the government, and the support in this area is indispensable.

3) Instituting a section responsible for flood/landslide and training of civil engineers (Mid-term plan)

A section responsible for flood control and landslide should be set up. In the section, engineers specialized in hydrology, soil mechanics, geology, hydraulics, river engineering, preparedness and rehabilitation should be assigned. Staffs who mastered the basic technology of civil engineering in WRD are reinforced, then the integrated section on analysis and countermeasures against disasters is founded.

4) Setting up the Hydrological Division (Long-term plan)

On the basis of the long term vision, hydrological section is founded. Hydrological section deals with not only disaster response but the river planning for flood prevention, water resources development plan for water supply and hydropower generation.

5) Expansion of community based disaster prevention and development of the capacity (Short-term plan)

As a part of the activities for community based disaster prevention, simple monitoring for rainfall and river water level has been carried out by local residents in the JICA project. Simple forecasting method monitoring the tendency of water level rising in rivers has become possible. Furthermore, it is necessary to raise forecasting accuracy by accumulating monitored data. The project which incorporates preparation of hazard maps by participatory method, education for disaster prevention, and evacuation drills are carried out.

(5-3) Proposed Assistance

Based on the current situation and issues, proposed assistance for cyclone, flood and landslide in is shown as follows.

Table 2-33 Proposed Assistance for Cyclone, Flood, and Landslide, Solomon

No.	Proposed Assistance	Items with Priority
1	Strengthen Community Based Disaster Prevention	Strengthen community based capacity building
		Preparation of disaster risk maps
		Evacuation drills in local community
		Improvement of networking system for rain gauges and water level recorders
2	Introduction of Data Collection System for Rainfall and River Water Level	Introduction of network system for rainfall in Guadalcanal Island
		Selection of pilot basins
		Improvement of network for weather observation
		Arrangement, analysis and archive for hydrological data
3	Engineer Training for Floods, and landslide in Setting Up a Flood and Landslide Section	Training for arrangement and analysis on disaster records
		Training on countermeasures for disasters
		Education programme (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)
		Rehabilitation works
		Flood management, sediment control
		River engineering (Structural measures, Non-structural measures)
		Cost estimate

		Preparedness and response
4	Integrated Water Resources Management (IWRM), Integrated Flood Management (IFM)	Water resources development plan (Water resource potential, Drought)
		Flood management plan (Flood control plan, Run-off analysis)
		River improvement plan (Design discharge, River improvement plan, Basion management plan, Non-structural measures)
		Set up of water level for the warning
5	Capacity Building, setting Up the Hydrological Division	Foundation of a flood control division and training center
		New legal system (River law, Water resources development law, Sediment control law)
		Foundation of local divisions
		Employment of civil engineers and capacity building
		Budget
		Equipment and buildings

(6) Information and Communication System

1) Current Situation

Solomon Island Broadcast Service

Currently, Solomon Island Broadcast Service (hereafter: SIBC) provides access of emergency information for public as a member of Initial Response and Assessment Cluster (IRAC) of NEOC. Through landline, emergency information provided by NDMO has been broadcasted by medium wave and shortwave radio.

Activities during state of emergency were stated in SOP according to Broadcast Act, Disaster Act and MOU (Minutes of Understanding) between participating institutes in the cluster. SIBC's working hour is normally 6am-11pml. While NDMO declares state of emergency, it will be 24 hours shift. Therefore, in case of tsunami warning, SIBC cannot respond if it is during the break hours.

Table 2-34 Outline of the SIBC, Solomon

staffs and Organization	Honiara Office 48 persons: Engineering 7, Announcer 18, Reporter 8, Sales 5, Administration 7, Ghizo Branch Office 3 Rota Branch Office 1
Annual Budget	S\$ 9mil (¥ 90 mil) Ten percent (10%) of the annual budget is support from Government
Headquarter	Honiara
Branch Offices and Transmission Site	Ghizo, Rata

SIBC earns 90% of its budget from sponsors for its programmes. Many Governmental institutes have their programs on SIBC. Fare rate is the same as private broadcast companies. This budget does not cover maintenance for broadcast equipment. Currently, SIBC is still using the broadcast equipment provided by Taiwan provided 10 years ago. The coverage of broadcast network is around 80%. Previous coverage area, before transmission system was shut down, was 95% - 98%.

Telekom Solomon Island

Telekom Solomon Island (hereafter Telekom) is a member of IRAC. Telekom provides telecommunication equipment and informing system using SMS for institutions that are participating in emergency response. Telekom has more than 300 employees for maintenance in 8 provinces. Telekom mainly provides landline network service, internet access service and cellphone network service. Previously, Telekom had HF radio network. But it was taken over by the government. Currently, the coverage of cellphone network is expanding rapidly, but it is still limited in major cities. Telekom's major stockholder is National Provident Foundation, which means it is a para-state enterprise.

National ICT Unit

National ICT Unit (hereafter ICT Unit) is responsible for maintenance and operation of information system in governmental institutes. Currently, ICT Unit is working on renewal of network infrastructures for government institutes. By this project, inter-governmental network and application system will become redundant and increase bandwidth. In this project NDMO's office shall become a backup site and it will have servers for standby at the site.

Table 2-35 Outline of National ICT Unit, Solomon

Job Assignment	Plan, support, operate and maintain governmental information system and inter-governmental network
Organization	Ministry of Finance & Treasury
Employees	18 person in office 12 person dispatched in each Ministry's office
Headquarter	ICT Unit Office in Honiara
Backup Site	Inside NDMO
Annual Budget	S\$ 2.5mil (¥25 mil) It covers salary for staff and replacement cost for existing PCs'. Budget does not covers Project for network infrastructure renewal.

2) Problems and Issues

Service level decreased as the function of the equipment decreases due to lack of budget for its renewal. Since the work shift is not 24 hours, emergency response cannot be conducted in case tsunami occurs during night time. Areal cover ratio is only 80%, since a transmission antenna is not working at one of the branch offices. It should be 95% without the trouble.

Table 2-36 Problems and Issues in Information / Communication System, Solomon

Field	Problem and Issues			Details
	Law / Organization	Technical		
		Soft	Hard	
Information Sharing System		✓		Governmental officers often turn over and experienced officers are limited in local government. Therefore, in general, emergency response is not often very mature
	✓	✓		Development of guidelines and MOU to make smooth operation with telecom company are yet to come.

Emergency Warning System			✓	There is no replacement budget for the broadcast equipment. Therefore, equipment is significantly degraded. Transmission sites have stopped because of wearing and damages. Current coverage area of radio broadcast network is around 80% of the Nation.
		✓		There is no way to send out tsunami warning through SIBC during nighttime.

3) Proposed Assistance

According to above mentioned issues, following assistance can be proposed.

Table 2-37 Proposed Assistance for Information / Communication System, Solomon

No.	Programme	Items with Priority
1	Development of communication network	Network connection between monitoring institutes and mass media.
2	Solomon Islands Emergency Information Transmission Capacity Development	Radio network coverage improvement (Transmission site improvement)
		Capacity building for 24 Hours operation
		Renewal of broadcast equipment and electricity power Saving
3	Emergency Response Information Archive Center Development	Archive meteorological information
		Geo-spatial data delivery service infrastructure development
		Archive post disaster survey result
		Archive emergency response and post disaster review
		Archive education material for community disaster risk management

2.2.3 Papua New Guinea

(1) Policy, Administration and Organizations

1) Current Situation

The National Disaster Management Act was stipulated on 1984 and revised on 1987. On 1987, Disaster Management Plan was prepared. However, neither of them has been revised since then.

National Disaster Committee is established as the supreme organization for disaster management in national level under National Executive Council (NEC), Dept. of Prime Minister. The committee is composed of 7 secretary generals of relevant ministries and 2 NGO representatives. Under National Disaster Committee, Provincial Disaster Committees (MDC) and District Disaster Committees (DDC) are set up. As a coordination organization in national level, National Disaster Center is instituted. National Disaster Center is under verification for promotion to National Disaster Management Office (NDMO).



Figure 2-12 Administrative Chart of Disaster Management on National Level, PNG

During disasters, provincial disaster operation centers and district disaster operation centers are set up. SOP has never been prepared for either national or local level. Activities for disaster management are assigned to the organizations shown below.

Table 2-38 Organizations Responsible for Disaster Management, PNG

	Preparedness	Immediate Response	Rehabilitation, Reconstruction
Earthquake Tsunami	Dept. of Mineral Policy and Geo-hazards Management	NDMO, Organizations responsible for the properties/areas	Organizations responsible for the properties/areas
Cyclone, Flood, Landslide	Dept. of Environment and Conservation, Dept. of Works	do	¥Organizations responsible for the properties/areas

2) Problems and Issues

According to NEC staff, disaster risk reduction is not mainstreamed in national policy. Economic development is more prioritized. For its reason, following may be points were pointed out:

- a) Disaster management does not give incentive to politicians, since it does not attract people in elections.
- b) Tribal awareness is strong in an extended national land, and willingness to tackle to disasters is little.

Disaster management should be conducted in each of preparedness/forecasting, emergency response, urgent rehabilitation, and reconstruction. However, the work is concentrated in response and rehabilitation only, with less attention towards preparedness/forecasting, except volcanic observation in Rabaul.

3) Proposed Assistance

Proposed assistance is summarized below. Mainstreaming disaster management in policy is essential.

Table 2-39 Proposed Assistance for Administration and Organizations, PNG

No.	Proposed Assistance	Items with Priority
1	Empowerment of awareness of administration towards disaster management	<ul style="list-style-type: none"> • Mainstreaming disaster risk reduction in national policy • Enforcement of awareness towards importance on disaster risk reduction in the level of policy makers.
2	Revision of Disaster Management Plan	Capacity development of NDC
3	Preparation of SOP, disaster related manuals and hazard risk maps	<ul style="list-style-type: none"> • Making of SOP on national level, provincial level, and community level. • Manuals for making of hazard risk maps • Evacuation exercise: route, shelters, warning
4	Promotion of awareness on disaster risk in communities	Disaster education for promotion of awareness on disaster risk

(2) The Organization Responsible for Disaster Management

National Disaster Center (NDC), Dept. of Provincial and Local Government Affairs

National Disaster Center (NDC), Dept. of Provincial and Local Government Affairs is responsible for disaster management.

1) Current Situation

There are 10 staffs in NDC. During disasters, 3 staffs under deputy director general of NDC in charge of communication, conduct 24 hours shift. National Disaster Center (NDC) issues early warning on earthquakes and tsunami based on information reported from, Geo-hazards Div. Regarding cyclones and heavy rain, based on information reported from National Weather Service, members of National Disaster Committee is summoned to National Disaster Center. With the decision of the Committee, the Center issues emergency declaration. Radio instrument is installed in the neighboring room of the meeting room of the committee. Fax, e-mail, and mobile phones are used for communication among national and local administration. Use of SMS for early warning is under discussion with mobile companies such as Digicel. For communication between National Disaster

Center and local administration, radio system for hospital network is utilized. The radio system is the most reliable tool at present.

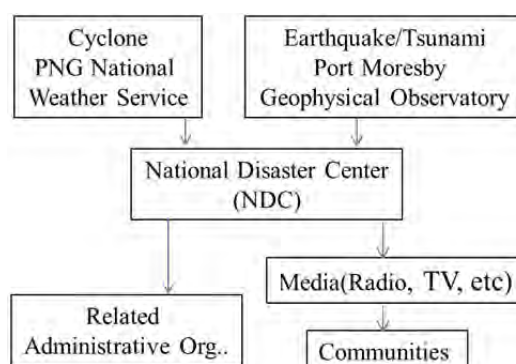


Figure 2-13 Transmission of Disaster Information, PNG

2) Problems and Issues

As have been mentioned, the government lacks awareness on disaster risk reduction. The capacity of disaster management of National Disaster Center is not sufficient both in number of staffs and in their capability. Communication lines between other administrative organizations are not well established.

3) Proposed Assistance

Mainstreaming disaster risk reduction is essential in national policy. Proposed assistance is summarized below.

Table 2-40 Proposed Assistance for Disaster Management, PNG

No.	Proposed Assistance	Items with Priority
1	Preparation of SOP	Monitoring of disaster information, evacuation order/warning, coordination with relevant organizations, communication, making manuals
2	Capacity Development of NDC Staves	Knowledge on disasters, capacity development on disaster management

(3) The Organization Responsible for Meteorological Observation and Forecasting

Papua New Guinea National Weather Service (NWS), Department of Transport is responsible for meteorological observation and forecasting.

1) Current Situation

NWS has manned meteorological observatories at each of fourteen airports in the PNG and has conducted weather observation, weather forecast and official announcement of alert and warning. Higher organization of NWS is Department of Transport because NWS was originally established for aeronautical weather observation. However, recent diversification of the weather services such as a

measure against global warming has become unfit for the current organizational form. Therefore, NWS are trying to be independent as "Bureau of Meteorology".

Table 2-41 Outline of NWS, PNG

Numbers of Staff	66+Part time: 20
Annual Budget	PNK. 5 mil (¥ 20 mil, 2011)
Umbrella Organization	Department of Transport
Fiscal Year	January-December
Application Deadline of Annual Budget for Next Fiscal Year	June
Organization	
● Forecast	22
● Observation	29
● Climate	7
● Operation & Maintenance	5
Others	3
Head Office	Port Moresby
Observation System	3 shifts (24hours: Port Moresby) 2 shifts (04:00-22:00: Other Observation Stations)
Forecasting System	3 shifts (24hours)
Adoption Plan for Climate Change	National Adaptation Strategy PNG
Manned Synoptic Station	14 (Data acquisition: every 3 hours)
Automatic Weather System (AWS)	4 (Data acquisition: every 3 hours)
Automated Weather Observing System (AWOS)	-
Upper Air Observation	2 (Radiosonde) ● Port Moresby (Not conducted due to lack of finance) ● MANUS (2 times/day by US support)
Transmitting Method of Observed Data to Head Office	From manned observatory: wireless communication (SSB), Telephone Link From AWS: SMS, GPRS
Forecast	Daily weather forecast (20 cities, 4 areas, 3 times/day) Coastal weather forecast (7 areas: 3 times/day) Marine weather forecast (4 ocean areas: 3 times/day) Airport weather forecast: TAF (45 airports: 4 times/day)
Distribution of Weather Information	Radio, TV, Newspaper, National Disaster Committee (NDC), Airport, Port Authority, shipping company, airline company
GTS	Disconnected Transmitting: The local observed data is transmitted to overseas through the connection with Willington by e-mail Receiving : The observed data from overseas cannot be obtained.
Collection Method of Other Forecasts/Warnings	EMWIN : Satellite data receiving equipment LRIT (Low Rate Information Transmission) : MTSAT Receiving equipment Regional Forecast of Bureau of Meteorology, Australia : Internet
Note	
Expansion Plan	- AWS (5) and Rain gauge (20) are planned to be installed by EU during 2012. - AWS (4) are planned to be installed by World Bank during 2012. - AWS (1) is planned to be installed by Australia during 2012.

2) Problems and Issues

Current problems and issues of NWS are indicated in the following table. Since weather observation in the southeastern part of the country which is a birthplace of cyclones in the South Pacific has not been conducted, the state of cyclones cannot be grasped quickly and correctly.

Table 2-42 Problems and Issues of NWS, PNG

Field	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation	✓		✓	Since Upper Air Observation equipment (Radiosonde) is not procured due to lack of finance, upper air observation cannot be continuously conducted.
Communication			✓	Since GTS and internet service are not available, NWS cannot obtain the observed data from overseas.
Analysis		✓	✓	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.
Forecast		✓	✓	NWS cannot forecast appropriately due to no upper air observed data, insufficient surface observation points and observed data.
Distribution of Information			✓	Since NWS has dependency on fax service for distributing weather information, an alternative distribution method considering fax stoppage in the emergency case is required.

3) Proposed Assistance

Based on the present conditions and the problems mentioned above, the following cooperation programmes are suggested in the field of weather observation and forecasting in PNG.

Table 2-43 Proposed Assistance for Meteorological Observation and Forecasting, PNG

No	Proposed Assistance	Priority Tasks
1	Strengthening of Meteorological Observation System (Provision of Equipment)	Automatic Weather System
		Wind Profiler
		GTS Message Switch
		Meteorological Data Management System
		Meteorological Satellite Data Receiving System
		Forecast Support System
		Early Warning System
		Meteorological Data Analyzing System
2	Capacity Building of Meteorological Observation and Forecasting (Technical Cooperation)	Meteorological Data Satellite Communication Equipment (VSAT)
		Equipment operation and maintenance
		Data quality control
		Weather information dissemination
		Weather forecasting

(4) The Organization Responsible for Earthquake and Tsunami Observation

Geo-hazards Division, Department of Mineral policy and Geo-hazards Management (DMPGM)

Geo-hazards Division, Department of Mineral Policy and Geo-hazards Management (DMPGM) is responsible for earthquake and tsunami monitoring in PNG.

1) Current Situation

Geo-hazards Division is composed of following three sections.

- Port Moresby Geophysical Observatory (POMGEO) for observation of earthquake and tsunami
- Rabaul Volcanic Observatory (RVO) for observation of volcanic activity in New Britain Island

- Engineering Geology for land slide and ground disaster

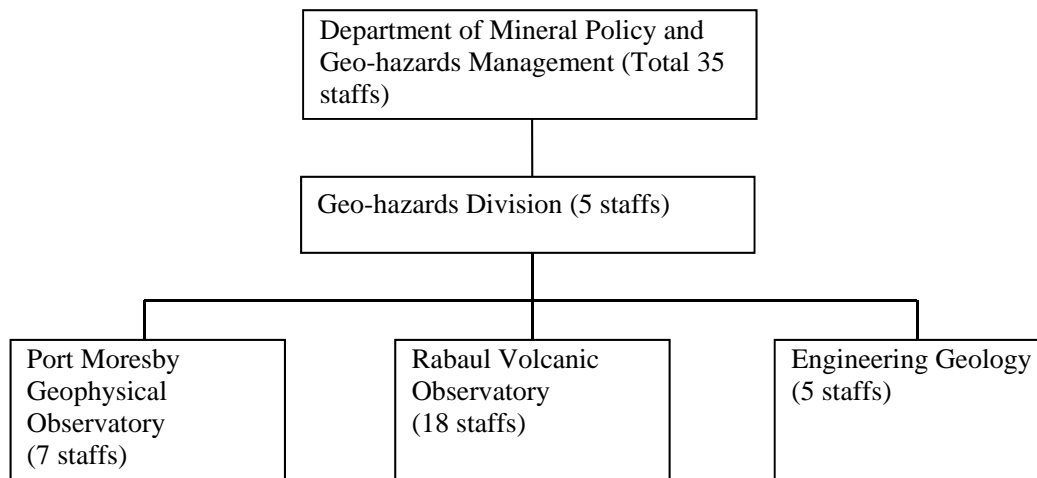


Figure 2-14 Organization and Number of Staffs in Geo-hazards Division, DMPGM, PNG

A seismometer was installed at three places; Port Moresby, Rabaul and Manus. The seismometer in Port Moresby installed by USGS is a wide range seismometer using Global Seismographic Network. Other two were installed by Geo-science Australian. DMPGM receives information on warning sign on tsunami by SMS and Fax, and sends it to NDC by HF radio, a mobile phone, Fax and e-mail. In Parallel, POMGEO collects information on intensity, location, depth, etc. of the earthquake through internet. Tsunami data is availed from Manus monitoring station which was installed by Australia. 2 staffs of the equipment were supplied through South Pacific Sea Level and Climate Monitoring Project, Australia.

Table 2-44 Outline of Geo-hazards Division, DMPGM, PNG

Number of Staff	35
Annual Budget	PGK 2.5mil (¥ 107 mil)
Organization	Department of Mineral Policy and Geo-hazards Management
Fiscal Year	January ~ December
Deadline of Budget Proposal for the Next Year	August
Staff Allocation	Port Moresby:7, Rabaul:18
Head Office	Port Moresby
Observation System	Single shift (07:45~16:06) *Provide staff dormitory nearby office
Countermeasures for Earthquake and Tsunami	Nil
Monitoring Station	Port Moresby : Installed by USGS Rabaul & Manus : Installed by Geoscience, Australia
Type of Seismograph	Digital broadband
Tide Gauge	Manus : Installed through South Pacific Sea Level and Climate Monitoring Project (SPSLCMP), Australia
Type of Tide Gauge	Sea Level Fine Resolution Acoustic Measuring Equipment a FRAME)
Transmitting Method of Observation Data to Head Office	Information from USGS and Geoscience Australia through internet (using common network but not direct network system)
Analysis of Earthquake (Identify Epicenter)	Not yet
Transmitting Method of Epicenter Information	Information from PTWC and JMA through internet and/or fax.

Transmitting Method of Tsunami Warning	Receiving early warning information from PTWC through SMS Receiving detail information from PTWC & JMA through fax
Distribution of Earthquake / Tsunami Information	Distribution to NDC through HF radio, mobile phone, Fax and e-mail (NDC give early warning/evacuation notice to concerning agencies)
Transmitting Method of Sea Level Data (Tsunami)	Sea level data at Manus: receiving information by the web site of South Pacific Sea Level and Climate Monitoring Project (SPSLCMP) , Australia
Criteria for Intensity of Earthquake	Nil
EMWIN	Nil
GTS	Nil
Future Plans / Programmes	Additional 10 earthquake monitoring stations will be installed by EU (Locations : Wewak, Tabubil, Mount Hagen, Lae, Hosking, Kavieng, Buka, Misima, Alotau and Port Moresby) It will be possible to identify the epicenter and magnitude after installation of 10 stations. <Difficulty for execution > <ul style="list-style-type: none"> • Still under processing of contract with network company (not yet mutual agreement not yet finalized) • High costs to share the communication line • Waiting for supplemental government budget for operation and maintenance
Education / Training	There is no seismology engineering faculty in universities in PNG. Therefore POMGEO staff is trained through on the job or delegated overseas training course in Japan/Australia etc.

There are 15 volcanology observatory stations in PNG. But these data are not commonly shared with POMGEO. The type of the whole observation equipment is analogue (record on roll paper). 8 out of 15 are manned.

2) Problems and Issues

The following table summarizes current problems and issues of POMGEO.

Table 2-45 Problems and Issues of POMGEO, PNG

Field	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation			✓	Cannot identify the epicenters and intensity by themselves due to few observation stations
	✓			Monitoring of earthquake is not operating for 24 hours (only in the daytime) due to shortage of staff and budget. It is impossible to issue early warning during non-operation time.
Communication			✓	Need for alternative communication network lines to receive earthquake information from outside of the countries (weakness in back-up communication line in case victims appear)
Analysis		✓	✓	Cannot analyze and judge possibility of tsunami caused by earthquake
		✓		Lack of technique and facilities for analysis
Distribution of Information			✓	Indirect warning system that will cause delay of evacuation (earthquake noticed to people via NDC)
Others			✓	EU seismographs have been already supplied but installation of seismograph is still pending due to several obstructions.

3) Proposed Assistance

Table below shows proposed assistance for earthquake and tsunami monitoring sectors.

Table 2-46 Proposed Assistance for Earthquake / Tsunami Monitoring, PNG

No	Assistance	Items with Priority	
1	Tsunami Monitoring Project	Supply Tide Gauge / Sea Level Gauge	
		Install VSAT (Very Small Aperture Terminal) network : To send sea level data to research institute in Japan through VSAT	
2	Operational Supporting Project for POMGEO	Operation / Maintenance	Formulation of operation and maintenance manuals for equipment
			Formulation of inventory/registration book for equipment
			Formulation of technical specifications and procurement including spare parts list
			Training of technical staff for maintenance, find the trouble, cause, improvement and recovery
			Procurement and calibration of monitoring equipment
		Monitoring / Analysis	Training for minimize the notice time and improvement of accuracy
			Training of communication technology to the public
Training of filing technology for data archive			
3	Seismic Resistant Buildings/Structures	Formulation of Seismic Code	Innovation of seismic resistant structure for buildings and civil works to improve earthquake risks

(5) The Organizations Responsible for Cyclone, Flood and Landslide

The organization in charge of hydrological monitoring is Water Resources Branch (WRB) under the Department of Environment (DOE) by law. The Department of Works (DOW) is responsible for the implementation of river projects. Main activities of DOW are construction of roads and bridges for transportation. But DOW has never implemented river projects. There is no organizations which have integrated jurisdiction over flood control and Landslide prevention synthetically in the government of PNG.

Water Resources Branch (WRB), Department of Environment (DOE)

1) Current Situation

The WRB conducts hydrological monitoring for rainfall and water level in rivers. The purpose of hydrological monitoring is mainly the water resources development for water supply and hydropower generation. Monitoring for flood protection is not carried out. Since telemetering systems have not been installed and the staffs also run short, there is no sufficient monitoring capability in the organization. Flood forecasting/warning is not practiced. As for groundwater level, it is monitored by the Department of Mines. As related laws, there are the Water Resources Act (WRA) enacted in 1982 and the Environmental Act (EA) enacted in 2000. In accordance with WRA, WRB carries out an approval of water permits.

4 regular officers are assigned to WRB. Annual budget of WRB is PGK 50 Thousand (¥ 2.15 mil).

Table 2-47 Outline of WRB, PNG

Tasks	Monitoring and arrangement for rainfall and water level in the river
Number of Officers	4

Annual Budget	PGK 50,000 (¥ 2.5 mil)
Period for Data recorded	Recorded data varies from 20 years to 30 years before the year of 1994. In 1994, monitoring was stopped.
Rivers for Monitoring	Laloki River (3 stations), Goloka River (2 stations)

The monitoring by WRB is conducted at three monitoring stations in Laloki River and at two monitoring stations in Goloka River. These stations are installed by the Hydrological Cycle Observation System Project (HYCOS) by EU. There was external budget for monitoring from 2005 till 2010. However, there has been no budget since 2011. It is run by the government own budget. There were 24 rain gauge stations and 60 water level recorders in 1980's. However, monitoring activities were stopped due to decrease of budget in 1994. Only the above-mentioned 5 observation stations remain. The national policy gave higher priority to education and the health. The budget for disaster prevention has been reduced sharply.

The WRB consists of hydrological engineers. These engineers received education and training in hydrology. There were 15 staffs at the maximum during the period of 1980 to 1998 when many monitoring stations were operated. After the budget became insufficient, engineers in WRB turned to the energy related fields, such as LNG projects. At present in 2012, there are only four senior engineers. There is no young engineer. From now on, WRB plans the reinforcement of the new work of hydrological monitoring and employment of young engineers.

2) Problems and Issues

Problems and issues on WRB are as follows.

- a) Although WRB carried out hydrological monitoring for national water development and hydropower generation, most of the monitoring stations were closed due to shortage of the budgets in 1994. There are two rivers for monitoring with five stations. This monitoring system is insufficient from the view point of data filing/processing for water resources development
- b) Staffs in WRB received the education in hydrology, however, any of the 4 engineers is capable of sufficient monitoring activities. Introduction of telemetering system and increase of number of capable engineers will be required.
- c) In PNG, the importance of flood observation is recognized. However since staves and budgets are insufficient, countermeasures against floods are not implemented.

3) Proposed Assistance

The major problem in flood management is that the substantial countermeasures against flood is not made due to shortage of the budget and low-priority of disaster risk reduction. As responsible organizations for flood management, WRB should conduct hydrological monitoring, and DOW should conduct planning/implementation of countermeasures. The former carries out only hydrological monitoring aiming at water use, and has stopped almost all monitoring after the year of 1994. The latter performs mainly conduction of infrastructures for land transportation and waterway traffic, and it

is not conducting measures against floods. DOW has to recognize flood as disaster phenomenon, and analyze the causes. Furthermore, DOW has to also take responsibility for both the structural and non-structural measures for flood control.

Talented engineers are unevenly distributed to energy sectors. Shortage of both experienced and young engineers is a real problem in WRB. Improvement of organization including the setup of the hydrology section, increase number of engineers in hydrology, and introduction of telemetry monitoring system are needed in WRB.

Taking into account the current situation, on the basis of the long term vision for the target year of 2030, it is required to launch the river hydrology section, and to draw up the plan for flood control, and water resources development.

Besides the assistance for organizations mentioned above, on the basis of the long-term vision, the Office of Climate Change & Development (OCCD) has been founded under Cabinet Office, OCCD analyzes various hazards such as high tide, tsunami, flood, landslide, and malaria damage. OCCD also analyzes agricultural output reduction damage. As a result, it recommends that three hazards such as malaria damages, high wave damages in the coastal areas and floods are identified as disasters which should be solved urgently, and the measures for these hazards shall be taken towards 2030.

For the time being, as for the measures for high tides in the coastal areas, OCCD concludes that introduction of an early warning system and afforestation by mangrove trees are effective. As for the flood control, it is planned to conduct flood analysis in Wagli River. However, since there is no data, an analysis using remote sensing technology/GIS systems and satellite geographical feature information is planned. The assistance for this field should be examined.

The following assistance is proposed of prevention for flood and landslide in PNG.

Table 2-48 Proposed Assistance for Cyclone, Flood and Landslide, PNG

No.	Proposed Assistance	Items of Priority
1	Introduction for Data Collection for Rainfall and Water level in the River	Introduction of network system for control
		Selection of pilot basin for flood prevention
		Improvement of network for weather elements
		Arrangement, analysis and archive for hydrological data
2	Engineer Training for Floods, Sediment Management including the Foundation of the Disaster Prevention Section	Training for arrangement and analysis on disasters
		Training on measures for disasters
		Education program (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)
		Rehabilitation works
		Flood management, sediment control
		River engineering (Structural measures, Non-structural measures)
		Cost estimate
		Preparedness and response
3	Integrated Water Resources Management (IWRM),	Water resources development plan (water resource potential, drought)
		Flood management plan (flood control plan, run-off analysis)

	Integrated Flood Management (IFM)	River improvement plan, land use, basin management (River improvement plan, land use, river management plan, non-structural measures) Set up of water level for the warning
4	Capacity Building, Foundation of New Organization	Foundation of flood protection section and river planning training section New legal system (River law, Water resources development law, Sediment control law) Foundation of local division Employment of civil engineers and capacity building Budgets Supply equipment and buildings
5	Climate Change Adaptation for OCCD	Remote sensing technology on flood monitoring and analysis Data formulation for GIS (rainfall, discharge, DEM, geomorphology, basin classification, geology, land use, assets) Hydrological analysis, runoff analysis, inundation analysis Preparation of hazard map Technical transfer for analysis Supply equipment

(6) Information and Communication System

1) Current Situation

In general, communication liaison and information systems are fragile in PNG. In state of emergency, establishing communication lines are up to each participating institutes. Currently, telephone and fax are the most common way to communicate. For public, state-run broadcast is the most major way of getting emergency information. The PNG government is also developing warning system for coastal flood using cellphone network. But only one (1) major telecom company has participated in this project and it is still under construction level. Currently, relevant departments are preparing Standard Operation Procedure (SOP) and yet see the result.

Communication infrastructures in relevant departments are managed by governing agencies. Therefore, each agency has its own contract between Internet Service Provider (ISP). To avoid increasing prices for internet connection, some departments are using telephone and fax for major communication. In addition, at local area, the condition of communication lines is worse than major cities. It is assumed that information sharing are difficult between National Disaster Center as a head-quarter and provincial disaster committees or district disaster committees.

To express emergency warning for public, radio broadcast network provided by National Broadcast Service (NBC) is mainly utilized. In addition, for coastal flooding areas, Office of Climate Change and Development (OCCD) is developing Coastal Early Warning System (CEWS) which utilize SMS through cellphone network. OCCD have arranged agreement between relevant departments and Digicel (major cellphone company) on 2011. Currently, CEWS is already in service. But other major cellphone company has not joined. Also, SOPs in each relevant department were yet to be ready. Therefore, CEWS is considered as under development system.

2) Problems and Issues

It is difficult to avoid effect of increasing cost of communication while each agency contracts with ISPs separately. Either government owned network or change government procurement policy to make comprehensive contract between each agency and ISPs. It will need some time for PNG government to develop network environment using internet connection.

Table 2-49 Problems and Issues in Information / Communication System, PNG

Field	Problem and Issues			
	Law / Organization	Technical		Details
		Soft	Hard	
Information Sharing System			✓	By depending on ISP's infrastructure, communication cost is easily affected by inflation. Other than using telephone and fax, it is difficult to afford communication cost.
		✓		The data is difficult to reuse. The system relies on telephone and fax.
	✓			Procurement policy which limits option to develop own network or making comprehensive contract between agencies and ISPs.
Emergency Warning System			✓	It is difficult to find inexpensive internet connection
		✓		Only 1 major cellphone network company joins the Emergency Warning System. Its network coverage is not big enough.
		✓		Relevant department yet to develop SOP. Therefore, warning cannot be transmitted rapidly.
	✓			Each relevant department have poor observation and forecasting environment.

3) Proposed Assistance

According to above mentioned issues, following assistance is proposed.

Table 2-50 Proposed Assistance for Information / Communication System, PNG

No.	Proposed Assistance	Items of Priority
1	Early Warning System Development	Making hazard maps
		Preparation of guidelines for private company and SOP
		Developing communication network between participating institutes
		Disaster prevention education for communities

(7) Others

Office of Climate Change and Development

Office of Climate Change and Development (OCCD) is the policy making organization in PNG. OCCD is the designated national entity for, UNFCCC (United Nations Framework Convention for Climate Change). OCCD used to be Office of Climate Change and Environment Sustainability (OCCES) and has been changed under direct control of the Prime Minister. OCCD coordinates the activities and policy making of government organizations. There are 20 staffs.

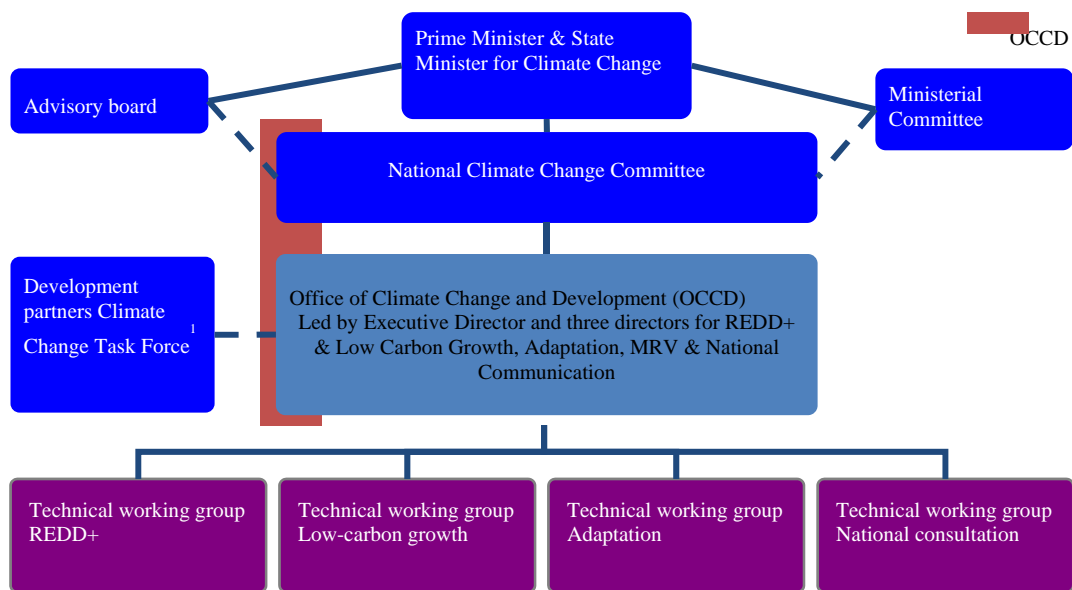


Figure 2-15 OCCD and Upper Organizations, PNG

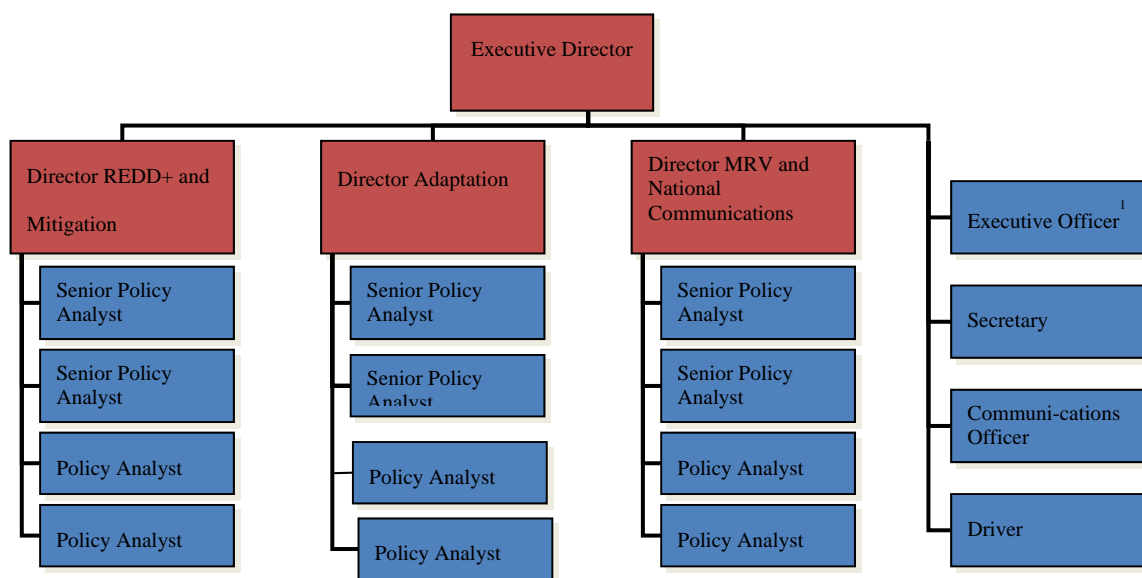


Figure 2-16 Organizational Chart of OCCD, PNG

Malaria, drainage problems and coastal inundation are the 3 key risks related with climate change, in OCCD policy. OCCD is tackling to these issues with priority. Regarding malaria, KOICA is formulating assistance project. With ADB, based on SPCR (Strategic Program for Climate Resilience), projects with budget scale of US\$40mil (¥32bil) (US\$20mil for grant aid, and US\$20mil for loan) have been under planning.

Outline of the ADB projects follow:

- Building Climate Resilient Communities
- Addressing Climate Change Risks to Food Security
- Capacity Building to Support Transformation to a Climate Resilient Development Path
- Climate Proofing Critical Infrastructure

2.2.4 Vanuatu

(1) Policy, Administration and Organizations

1) Current Situation

Disaster Management Act was stipulated on 2000, which is being reviewed for revision by SOPAC. Disaster Risk Reduction and Disaster Management National Action Plan (2006 – 2016) was prepared on 2006. In the plan, 8 strategies; mainstreaming national policy and budgeting on disaster management, improvement of knowledge and information system on disasters, capacity development, etc. The activities are categorized into three achievement timings terms: short term (2006 – 2009) , Mid-term (2006 -2012) and long term (2006 -2016) . 1.5% of the national budget, Vt 16mil. was allocated on 2011 for disaster risk reduction. In addition to this, Disaster Emergency Fund has been prepared for emergency response.

Based on the Disaster Management Act, National Disaster Council (NDC) has been established. NDC is the decision making organization for disaster management on national level. On the local level, provincial disaster committees (PDC) are established in 3 provinces. The councils are under preparation in the remaining 3 provinces. In the provinces, secretary generals are nominated chairs of provincial disaster committees. In 75 areas under the provinces, area disaster committees (ADC) are established. Since these administrative organizations on the local level are under preparation, communication system between the sites and the committees are imperfect, which cause difficulty on monitoring situations in remote islands and extending assistance towards them.

National Disaster Management Office (NDMO) has been instituted as a coordination organization on national level. NDMO is responsible for coordination during disaster occurrence, preparedness and capacity development of organizations related with disaster management.



Figure 2-17 Administrative Chart of Disaster Management on National Level, Vanuatu

NDMO functions as coordinating body of NDC during disaster occurrence. NDMO, and Meteorology and Geo-hazards Dept. (VMGD) are accommodated in a same building to have good communication between each other. However, SOP has been prepared in VMGD. SOP is also prepared for 2 islands with active volcanos. SOP has not been prepared at all in other organizations on either national or local level.

In the Building Code, earthquakes are not taken into account. Dept. of land, Ministry of Lands, Energy, Environment, Geology, Mines, and Water Resources controls land use of hazard prone areas. Activities for disaster management are assigned to the organization shown below.

Table 2-51 Organizations Responsible for Disaster Management, Vanuatu

	Preparedness	Immediate Response	Rehabilitation, Reconstruction
Earthquake Tsunami	VMGD	NDMO, Organizations responsible for the properties/areas	Organizations responsible for the properties/areas
Cyclone, Flood, Landslide	DPW	do	Organizations responsible for the properties/areas

2) Problems and Issues

- 1) SOP should be prepared in each of the organizations on both national and local levels.
- 2) Disaster education is conducted in schools, while the knowledge does not disseminate over whole the communities. Evacuation exercise is not done in the communities.
- 3) Communication during disaster is important. Setting up information networks and assigning coordinators are needed. Use of SMS is under study.
- 4) In Port Villa, integrated flood control is needed, due to extended habitation over flood prone zones and decrease of water holding capacity of the basin. Instituting a responsible agency for flood control is needed.
- 5) Capacity building of staffs on provincial/areal levels is urgent need.

3) Proposed Assistance

Table 2-52 Proposed Assistance for Administration and Organizations, Vanuatu

No.	Proposed Assistance	Issues with Priority
1	Preparation of Manuals	SOP on national level, SOP on provincial/areal level Manuals for making hazard risk maps
2	Education and Training	Disaster education Hazard maps Evacuation exercise
3	Capacity Building in Organization for Flood Control	Setting up on integrated agency Capacity building of staffs

(2) The Organization Responsible for Disaster Management

National Disaster Management Office (NDMO), Ministry of Internal Affairs

National Disaster Management Office (NDMO), Ministry of Internal Affairs is responsible for disaster management on national level.

1) Current Situation

Based on Disaster Risk Reduction and Disaster Management National Action Plan (2006 – 2016), the office is in the same building as Meteorology and Geo-hazard Dept.(VMGD). It is composed of 5 sections with 8 staffs. The office used be instituted in Police Dept., Ministry of Internal Affairs. Since 2010, NDMO has been independent from Police Dept. and accommodated in VMDG building. 24 hours shift is set up, during emergency.

At the occurrence of disasters, NDMO conducts coordination of relevant organization under direction of NDC. Disaster Emergency Center with 5 clusters is going to be established during disaster occurrence. The system is actually put into practice at present. The clusters consist of logistics, health, education, agriculture, and water sanitation. At present, NDMO still has some difficulty in management of the clusters NDMO depends on NGO, in monitoring the site situation and coordination with external assistance.

Monitored information by VMGD is reported to NDMO. In case of emergency, NDMO transmits the information to media and relevant organizations including ADCs and PDCs, with direction of NDC. For communication tools among administrative organizations, fax, e-mail, and hand phones are used. There is no problem in this system expect with Aniwa Island and Fortuna Island that are located at the southern end, where radio is used. Use of SMS is under negotiation with private mobile-phone companies, such as Digicel.

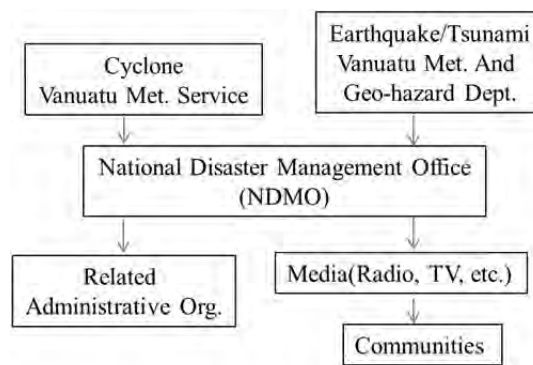


Figure 2-18 Transmission of Disaster Information, Vanuatu

During normal time, NDMO conducts activities in preparedness, such as ①disaster education, ② setting up administrative system on provincial/areal level ③collaboration with NGO and relevant organizations. Disaster education at schools is being conducted in collaboration with Ministry of Education. Disaster education is incorporated in the school curriculum.

2) Problems and Issues

- a) Disaster management has high priority in national policy. The stand point of NDMO is clear. However the capacity for putting the responsibility into practice is insufficient in both number of staffs and their ability. This problem is clear by looking at the fact that AusAID volunteer is assigned to NDMO.

- b) The problems and issues mentioned in “Administration and Organizations” are to be solved with NDMO initiative.

Table 2-53 Proposed Assistance for Disaster Management, Vanuatu

No.	Proposed Assistance	Items with Priority
1	Capacity building of NDMO	Professional knowledge as disaster management agency Monitoring Issuance of warning/direction Logistics
2	Improvement of communication system	Securing quick and safe communication system Use of SMS Quick communication with remote islands

(3) The Organization Responsible for Meteorological Observation and Forecasting

Vanuatu Meteorology and Geo-hazards Dept. (VMGD), Ministry of Infrastructure and Public Utilities

Vanuatu Meteorology and Geo-hazards Dept. (VMGD), Ministry of Infrastructure and Public Utilities) is responsible for weather observation and forecasting.

1) Current Situation

In VMGD, Observation Section and Weather Forecasting Section (VMS: Vanuatu Meteorology Service) conducts weather observation and forecasting respectively. Current situation of VMGD is summarized in the following table. Although the information from the observation points owned by VMS has not been enough yet. It utilizes SATAID and other methods which were learned through JICA project and other organizations’ training. VMS carries out its duty by devising in the limited conditions. In this year (2012), JICA study team will be dispatched for the DRR system establishment project in Vanuatu and Fiji. VMS is going to propose five (5) sets of AWS, two (2) sets AWOS and one (1) set of telecommunication system for the study.

Table 2-54 Outline of VMS (Observation Section and Weather Forecasting Section), Vanuatu

Numbers of Staff	59+Part time: 15
Annual Budget	Vt1.24 bil (¥1.11bil, 2011)
Umbrella Organization	Ministry of Infrastructure and Public Utilities
Fiscal Year	January – December
Application Deadline of Annual Budget for Next Fiscal Year	July
Organization	
● Forecast	8
● Observation/Equipment	20
● Climate	7
● Communication	7
● Operation & Maintenance	9
● Others	8
Head Office	Port Vila
Observation System	3 shifts (24hours)
Forecasting System	2 shifts (24hours)
Adoption Plan for Climate Change	National Adaptation Programme of Action :NAPA (2007)
Manned Synoptic Station	7 (Data Acquisition: Every 3 hours)
Automatic Weather System (AWS)	-

Automated Weather Observing System (AWOS)	-
Upper Air Observation	Radiosonde (Currently not used)
Transmitting Method of Observed Data to Head Office	Wireless Communication (SSB)
Forecast	Daily Weather Forecast (3 areas: 5 times/day) Weekly Weather Forecast (6 states: 2 times/day) Marine Weather Forecast (4 ocean areas: 3 times/day) Airport Weather Forecast: TAF (7 airports: 4 times/day)
Distribution of Weather Information	Radio, Newspaper, Private Company (Airline, Shipping Company)
GTS	Connection with Melbourne by Dedicated Link (Internet FTP)
Collection Method of Other Forecasts/Warnings	EMWIN : Satellite Data Receiving Equipment LRIT(Low Rate Information Transmission) : MTSAT Receiving Equipment Regional Forecast from Fiji Regional Specialized Meteorological Center: Internet
Note	
Expansion Plan	AWOS (2) and AWS (5) are planned to be installed under the Grant Aid for Disaster Prevention and Reconstruction of Japan.

2) Problems and Issues

Current problems and issues of VMS are indicated in the following table.

Table 2-55 Problems and Issues of VMS (Observation and Weather Forecasting), Vanuatu

Field	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation	✓		✓	Since VMD does not have many observation points due to lack of finance, the observed data is not enough.
	✓		✓	Since Upper Air Observation equipment is not procured due to lack of finance, upper air observation cannot be conducted
Communication			✓	Since VMD has dependency on internet service of the local provider for obtaining the observed data from overseas, an alternative communication method considering internet stoppage in the emergency case is required.
Analysis		✓	✓	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.
Forecast		✓	✓	VMD cannot forecast appropriately due to no upper air observed data and lack of surface observation points and observed data.
Distribution of Information			✓	Since VMD has dependency on internet service of the local provider for distributing the observed data to overseas, an alternative communication method considering Internet stoppage in the emergency case is required.

3) Proposed Assistance

Based on the present situation, problems and issues, following assistance is proposed. In order to improve the accuracy of weather forecast, upper air observation should be conducted and necessary capacity is needed to be strengthened.

Table 2-56 Proposed Assistance for Meteorological Observation and Forecast, Vanuatu

No	Proposed Assistance	Items with Priority
1	Strengthening of Meteorological Observation System (Provision of Equipment)	Airport Weather Observation System
		Wind Profiler
		Meteorological Data Management System
		Meteorological Data Satellite Communication Equipment
		Early Warning System

		Meteorological Data Analyzing System
		Meteorological Data Satellite Communication Equipment (VSAT)
2	Capacity Building of Meteorological Observation and Forecasting (Technical Cooperation)	Equipment Operation and Maintenance
		Data Quality Control
		Weather Information Dissemination
		Weather Forecasting

(4) The Organization Responsible for Earthquake and Tsunami Observation

Vanuatu Meteorology and Geo-hazards Dept. (VMGD), Ministry of Geo-hazards Monitoring and Public Utilities

Vanuatu Meteorology and Geo-hazards Department (VMGD), Ministry of Infrastructure and Public Utilities are in charge of earthquake and tsunami in Vanuatu. Former 3 departments such as Meteorology, Volcanology and Seismology were unified into this department in year 2010.

1) Current Situation

In VMGD, Geo-hazards Monitoring Section conducts earthquake observation. VMGD consists of following 6 sections with 60 staffs.

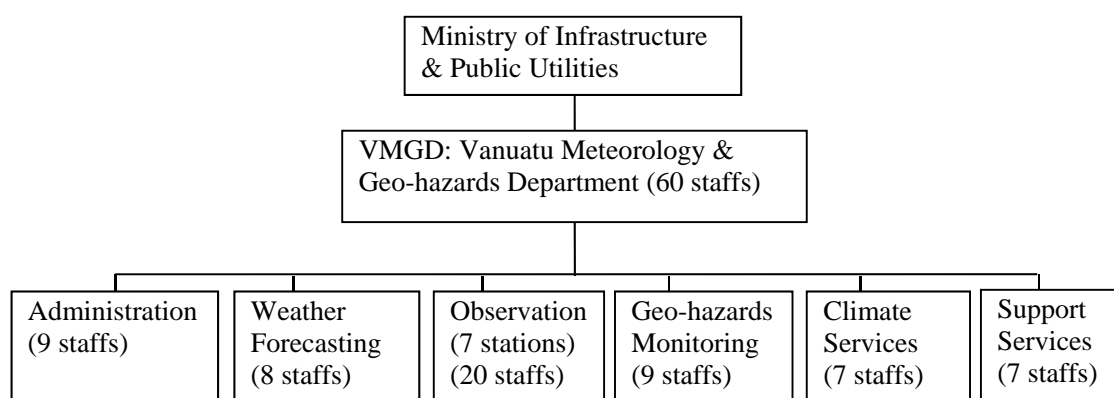


Figure2-19 Organization of VMGD and Number of Staffs, Vanuatu

Table below shows current situation of VMGD.

Table2-57 Outline of VMGD (Geo-hazards Monitoring Section), Vanuatu

Number of Staff	60 (among the total, seismology staff: 9)
Annual Budget	Vt 124 mil (¥ 124million)
Organization	Ministry of Infrastructure and Public Utilities
Fiscal Year	January ~ December
Deadline of Budget Proposal for the Next Year	July
Technical Staff	Observation : 4、 Equipment Maintenance : 4、 PC Operation : 1
Head Office	Port Vila
Observation System	24hours operation with 3 shifts (each shift 8 hrs)
Adaptation Plan for Earthquake and Tsunami	Nil

Monitoring Station	4 stations: Port Vila (PVM)、Rentapau (RTV)、Devip's Point (DVP)、Santo (Sanvu) Additional 1: Installed by French		
Type of Seismograph	SANVU、PVM & DVP		
Sea Level Gauge	Port Vila & Santo		
Volcanology Observation Station	2 stations		
Transmitting Method of Observation Data to Head Office	Through internet: Port Vila & Santo stations Through VHF: Rentapau & Devip's Point stations		
Analysis of Earthquake Data (Identify epicenter)	Not yet		
Transmitting Method of Tsunami Information	Receiving information from PTWC and JMA through fax.		
Distribution of Earthquake Information	Domestic	Initially inform to NDMO, then NDMO publicize through radio, e-mail and web site of VMDG	
	Foreign Countries	Commonly share with Pacific countries through IRIS (Incorporated Research Institutions for Seismology)	
Criteria for Intensity of Earthquake	Not yet established		
EMWIN	Available EMWIN-II		
GTS Network	Nil		
Future Plan / Programme	<ul style="list-style-type: none"> • Plan to use SMS for tsunami warning (Under negotiation with mobile company) • Vanuatu Seismic Network Project by JICA (2012-2015, ¥ 300 mil) : Including procurement of meteorology, earthquake and tsunami monitoring equipment. Newly establishing 4 monitoring stations. • Vanuatu Tsunami Warning System by WB (2012-2016、US\$1.40mil) procurement of tsunami warning alarm system, siren, evacuation signage, hazard map, etc. 		

VMGD has installed MWIN-II to receive information from PTWC Hawaii. Sea surface level gauges have been installed at Port Vila and Santo respectively. Compared with this, monitoring station for volcanic activities that frequently cause damages is insufficient.

2) Problems and Issues

The following table summarizes the current problems and issues in VMGD. After improved earthquake and tsunami monitoring system by the planned project, it is necessary to strengthening volcanic monitoring system to mitigate annual disaster.

Table2-58 Problems and Issues of VMGD (Geo-hazards Monitoring Section), Vanuatu

Field	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation			✓	Can't identify the epicenter immediately due to lack of real time network system for analyzing earthquake in head office.
Communication			✓	The system of receiving far-earthquake information issued by international organizations through internet connection supplied by the local provider. has weakness (easy cut of the line) in case of disaster. Take account of this situation, other alternative back up network system is necessary.
Analysis		✓	✓	Can't analyze and judge the possibility of tsunami caused by earthquake yet
		✓	√✓	Lack of technology and facilities for the analysis

Distribution of Information	✓			Required corroboratory work with NDMO and VMGD to solve a delay of action for issuing warning in case of disaster.
			✓	Still can't use SAS to send tsunami information (under negotiation with mobile company)
Others				*The original proposer of ORSNET

3) Proposed Assistance

Table below shows proposed assistance for earthquake and tsunami monitoring. It is highlighted by introducing satellite network for strengthening regional network of volcano monitoring stations.

Table2-59 Proposed Assistance for Earthquake / Tsunami Monitoring, Vanuatu

Programme	Items with Priority
Volcanology Monitoring Project	Developing real time monitoring system for volcanos
	Introducing magma monitoring system
	Construction of radar network system to on volcanic activities.

(5) The Organizations Responsible for Cyclone, Flood and Landslide

(5-1) Department of Water Resources (DOWR), Ministry of Lands, Energy, Environment, Geology, Mines, and Water Resources (MOL)

Department of Water Resources (DOWR) , Ministry of Lands, Energy, Environment, Geology, Mines, and Water Resources (MOL) is responsible for monitoring of rainfall and management of water resources / flood control. The purpose of monitoring of the rainfall is for supply of water to waterworks and hydropower.

1) Current Situation

DOWR is composed of tow sections. In Water Resources Management Section, 3 technicians are assigned for rainfall monitoring and flood control planning. Annual budget is Vt 2mil. In Rural Water Supply Section, 14 technicians are assigned for well construction and laying pipes.

Table 2-60 Outline of DOWR, Vanuatu

Works	Monitoring of rainfall, recording the data. Making of master plans for water resources development and flood control.
Organization	2 hydrologists, 1 water quality analyst. There is no local branch.
Annual Budget	Vt 2 mi (¥ 1.8mil)
Ministry	Ministry of Lands, Energy, Environment, Geology, Mines, and Water Resources (MOL)
Rain Gauge Stations	3 at Efate Is., 2 at Santo Is.. Monitoring is done @ 5 sec.. Instrument is digitalized, but not telemeterized. Data logs are manually collected at certain intervals

There are 5 rain gauge stations in the country. They are all for water supply and hydropower. The river basins are small and the rivers are short. Therefore, Flood arrival time is short. For these conditions it is difficult to issue flood forecast / warning. Flood forecast is regarded not realistic.

At Luganville, the capital of Santo Island, they suffer flood damage by Latekate River. For flood control of the area, Integrated Water Management Guide Line for Latakata River, Luganville has been prepared.

At Port Vila, located in the lower basin of La Colle River and Tepokua River, floods occur. Therefore, The identical plan is going to be made with national budget. At present, DOWR is responsible for hydrological data collection and flood control planning while DPW is responsible for construction of structures.

2) Problems and Issues

- a) Hydrological data collection for flood control is not practiced.
- b) There is no civil engineer specialized in hydraulic analysis and flood control planning. Making of flood control countermeasures is conducted by donors.
- c) Collection of hydrological data and construction of flood control structures are conducted by different organizations. They should be integrated for efficient activities.

(5-2) Department of Public Works (DPW), Ministry of Infrastructure and Public Utilities (MIPU)

1) Current Situation

Department of Public Works (DPW) , Ministry of Infrastructure and Public Utilities (MIPU) is responsible for construction and maintenance of infrastructures such as roads, bridges and river structures. However, river structures have never been constructed. There are about 30 staffs in the Department. 7 of them are engineers. For the response of major disasters, a relief team, composed of PWD, NDMO, Police and Military, is set up and dispatched to the sites. The annual budget of PWD occupies 7 % of the total national budget. Most of the national budget is spent for education, health, and transport infrastructures. The amount for DRR is limited. During disaster occurrence, the government collects emergency fund from ministries. But this system makes the implementation of national annual plan difficult. Alternative method has been required.

2) Problems and Issues

Activities for DRR are limited to emergency response. Projects for preparedness are hardly done. With budget and manpower limited, promotion of preparedness should be enforced. Structural countermeasures are needed to be practiced once enough budget is secured.

(5-3) Proposed Assistance

Flood in major cities, such as Port Vila and Luganville is getting serious. As organizations for flood control, DOWR is responsible for flood control planning and DPW for construction of structures. However, flood control is not practiced at all as a matter of fact. Flood is not regarded as a major disaster and integrated organization for flood control does not exist. Enough budget is not secured and there is no manpower that can handle the issue.

It is necessary to regard the flood as a disaster. It is needed to plan countermeasures to reduce the risk by analyzing the phenomena based on the monitored data. Around the cities where urbanization is proceeding, land use control, and conservation of retarding capacity of the basin are needed. Integrated flood control should be introduced. For this purpose, integration of organizations and capacity development are essential. Nonstructural countermeasures, such as promotion of awareness among communities, should be enhanced.

Table 2-61 Proposed Assistance for Flood Control, Vanuatu

No.	Proposed Assistance	Items with Priority
1	Introduction for Data Collection System for Rainfall and Water level in the River	Selection of pilot basin
		Improvement of network for weather elements
		Arrangement, analysis and archive for hydrological data
2	Engineer Training for Cyclone and Flood, and Landslide	Training for arrangement and analysis on disasters
		Training on measures for disasters
		Education program (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)
		Rehabilitation works
		Flood management, sediment control
		River engineering (Structural measures, Non-structural measures)
		Cost estimate for river engineering
		Preparedness and response for floods
3	Integrated Flood Management (IFM)	Water resources development plan (Water resource potential, Drought)
		Flood management plan (Flood control plan, Run-off analysis)
		River improvement plan (Design discharge, River improvement plan, River management plan, Non-structural measures)
		Set up of water level for the warning
4	Capacity Building, Foundation of New Organization	Foundation of flood protection section and training center
		New legal system (River law, Water resources development law, Sediment control law)
		Foundation of local division
		Employment of civil engineers and capacity building
		Budget
5	Non-structural Method	Assistance for equipment and buildings
		Making of hazard maps Monitoring equipment, Simulation techniques

(6) Information and Communication System

1) Current Situation

NDMO and Vanuatu Meteorology & Geo-hazards Department (VMGD) are accommodated in a same building. This makes prompt information sharing easy among organizations for emergency response.

In this site, the organizations share local area network. Therefore, seamless data sharing environment have been formulated. In addition, national government is working on intra-government network (E-Government Project). It will connect Port Vila and provincial governments with Micro

Wave (MW) network. This network is also connected to this site. Infrastructures for data sharing have been improved.

Expressing emergency warnings to public is mainly through radio network. VMGD has already prepared SOP. VMGD also develops emergency warning system using cellphone network.

2) Problems and Issues

Recent reorganization has influenced on operations of emergency response clusters. NDMO depends on human resources from NGO. Currently, NDMO cannot take initiative for rolls which governmental institute should have.

Table 2-62 Problems and Issues in Information / Communication System, Vanuatu

Field	Problems and Issues			
	Law / Organization	Technical		Details
		Soft	Hard	
Information Sharing System			✓	e-Government network only covers 6 Provincial capital cities. Remote area and isolate island are depending on HF radio network. Some of the area are not covered by their network.
	✓	✓		It is still in the early stage of reorganization. Lack of human resources are obvious. Provincial Disaster Committee has yet to be organized for communication liaison and coordination. Infrastructure are yet effectively utilized.
Emergency Warning System			✓	Radio network is most popular information service. But remote area and isolate island are not covered.
		✓		Preparation of SOP is already done. But most of procedures are done by manual. There are a lot of rooms for speeding up.

3) Proposed Assistance

According to above mentioned issues, following assistance can be proposed for Vanuatu.

Table 2-63 Proposed Assistance for Information / Communication System, Vanuatu

Proposed Assistance	Items with Priority
Development of communication network	Network connection between monitoring institutes and mass media.

(7) The Organization Responsible for Land Use

Department of Land (DOL), Ministry of Lands, Energy, Environment, Geology, Mines and Water Resource

Department of Land (DOL), Ministry of Lands, Energy, Environment, Geology, Mines and Water Resources is responsible for land use to control of national property.

1) Current Situation

DOL consists of following 3 divisions.

Table 2-64 Outline of DOL, Vanuatu

Division	Number of Staff	Sections
----------	-----------------	----------

Land Survey Division	30	Mapping Section, Cartography Section, Survey Section
Land Registration Division	20	Registration of land
Land Division:	10	Lease execution and planning Section, Enforcement and Compliance Section, Evaluation Section

DOL controls land use by defining set-back area from the shorelines. It also defines set-back area within 50 m from the river center line on both sides, for environmental protection and flood mitigation. However, in urbanized area, migrants from remote islands are settled inside the restricted zones illegally. The government has to solve this problem in order to secure people's safety.

Regarding land survey, scale 1/50,000 topographical maps are issued, assisted by Australia. The maps cover the whole nation. NDMO plans to use the maps for making hazard maps. Hazard maps for two islands (Aniwa Is., Tanna Is.) are under preparation. These 2 islands were hit by Cyclone Jasmine in February 2012. Photographs of some priority areas are also available. Those maps were prepared by Australia in 2008. The nautical navigation map is issued by British Royal Navy in 1988. DOL is a member of NACCC (National Advisory Committee for Climate Change) in Vanuatu. Therefore DOL has responsibility on the tasks for climate change adaptation focusing on cyclone, seashore erosion and flood control from view point of land use.

2) Problems and Issues

DOL is not conducting disaster prevention activities due to shortage of budget and human resources. In order to tackle to these tasks, capacity development of staff is unavoidable

2.2.5 Tonga

(1) Policy, Administration and Organizations

1) Current Situation

National Disaster Management Act was stipulated on 2007. National Emergency Management Plan was prepared on 1987 and revised on 2008.

Based on the Act, National Disaster Committee was established as the supreme decision making organization. Inside NDC, following committees are set up.

- a) NEMC: National Emergency Management Committee

NEMC makes the national policy on disaster management stressing forecasting and preparedness.

- b) NEOC: National Emergency Operation Committee

NEOC is responsible for urgent response. Committee members are composed of CEOs from Prime Minister's Office, Ministry of Transport, Ministry of Works and Disaster Relief Activities, Ministry of Foreign Affairs Police Dept. and Military.

- c) NERC: National Emergency Recovery Committee

Under NDC, district emergency management committees have been set up in 5 provinces (Niua Fo'ou, Niuatoputapu, Vava'u Gourp, Ha'apai Group, and Eua) , except Tongatapu. There are more than 100 villages in the country. In each of them, a village emergency management committee is established.

As a coordination office, Emergency Management Office (NEMO) has been instituted.

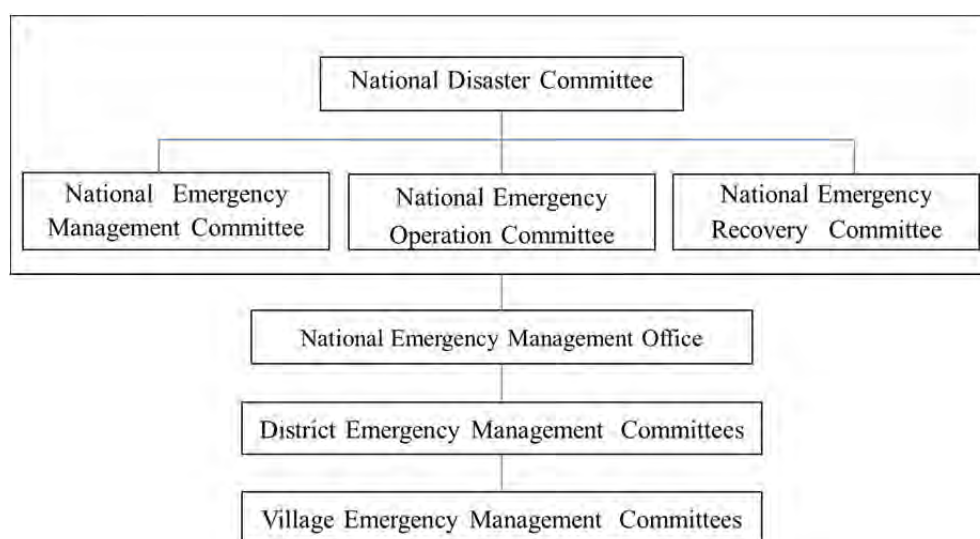


Figure 2-20 Administrative Chart of Disaster Management on National Level, Tonga

In case of disaster occurrence, National Emergency Coordination Center is set up. NDMO conducts coordination of the relevant organizations under the direction of the Center. SOP on the national level that works as the manual of NEMO is at the draft stage.

SOP on the provincial level is also under preparation. SOP on village level is under preparation by Australian NGO (Act for Peace) . 11 ministries have prepared emergency plans with the guidance of NEMO. Emergency plans are also prepared in 40 schools.

Activities for disaster management are assigned to the organization shown below

Table 2-65 Organizations Responsible for Disaster Management, Tonga

Kind of Disasters	Preparedness	Immediate Response	Rehabilitation, Reconstruction
Earthquake, Tsunami	① Geological Survey Unit, ② Tonga Meteorological Service	NDMO, Organizations responsible for the properties/areas	Organizations responsible for the properties/areas
Cyclone, Flood and Landslides	① Ministry of Works and Disaster Relief Activities ② Planning and Urban Management Agency	Do	Organizations responsible for the properties/areas

2) Problems and Issues

- a) Knowledge on disaster risk reduction has not been well disseminated to the communities.
Disaster education has just started at school, however, adults do not have sufficient knowledge.
- b) SMS has been provided for emergency warning. But it has not been fully used over the country due to its small capacity.
- c) In Nuku'alofa, urbanization is progressing and needs for countermeasures against drainage are increasing. A responsible organization for flood control is necessary.
- d) Geological Service Unit does not conduct 24 hours shift at present. This situation should be changed.

3) Proposed Assistance

Table 2-66 Proposed Assistance for Administration and Organizations, Tonga

No.	Proposed Assistance	Items with Priority
1	Disaster Education	Disaster education in communities Making of hazard maps Evacuation exercise
2	Capacity Building of Organization for Flood Control	Setting up flood control organizations Education staffs for flood control
3	Capacity Building for Earthquake and Tsunami Warning	Setting 24 hrs shift for earthquakes and tsunami warning

(2) The Organizations Responsible for Disaster Management

NEMO: National Emergency Management Office (NEMO), Ministry of Works and Disaster Relief Activities (MOW)

National Emergency Management Office (NEMO), Ministry of Works and Disaster Relief Activities (MOW) is responsible for disaster management on national level.

1) Current Situation

NEMO's major work is urgent response, while awareness, preparedness and rehabilitation are also included in its work. There are 4 staffs at present, composed of a coordinator, a communication operator, a secretary, and a driver. The director of the office is vacant at present. The annual budget is TOP 0.1mil. The total annual budget of the Ministry is TOP 2mil. The Ministry is composed of 5 departments; Building, Engineering, Building Code, Disaster Relief (NEMO) and Accounting Administration. During disaster occurrence, NEMO collaborates with relevant ministries, military and NGOs, as a coordination center under direction of NDC.

Regarding disaster information, Geological Service Unit (GSU) is responsible for earthquake and tsunami. However, Meteorological Service (TMS) issues urgent warning to media as GSU does not conduct 24hrs shift. TMS monitors PTWC information and near-earthquake information.

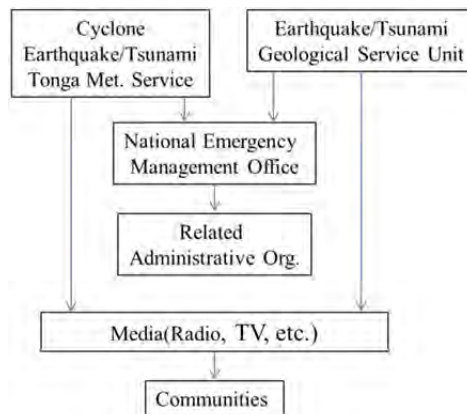


Figure 2-21 Transmission of Disaster Information, Tonga

During normal time, NDMO conducts propagation on disaster risk reduction to communities. Radio broadcasting is also utilized for the purpose for 30 minutes / month. A quiz programme sponsored by Ministry of Civil Defence and Emergency Management, New Zealand and SOPAC targeting primary school students was popular. Disaster education is set up in the curriculum of physical education, in primary schools. An identical curriculum is being prepared for secondary schools. NEMO staff presents lectures on disaster risk reduction in schools as lecturers.

2) Problems and Issues

- a) Knowledge on disaster risk reduction has not been fully disseminated over the communities.
- b) The scale of budget is small and number of staffs is little. Therefore, the activity for propagation on disaster risk reduction over the communities is limited.

- c) Hazard maps cannot be prepared since there is no sea charts. For this reason, evacuation exercise is difficult.
- d) Major activities are limited to urgent response.

3) Proposed Assistance

With limited budget and personnel, it is required to promote the awareness of the people.

Following assistance is proposed

Table 2-67 Proposed Assistance for Disaster Management, Tonga

No.	Proposed Assistance	Items with Priority
1	Disaster Education/Exercise	Education of knowledge on cyclone, earthquake, and tsunami
		Hazard risk
		Evacuation shelter, evacuation route
2	Hazard Maps	Filing records on past disasters
		Simulation of hazard
		Making hazard maps
3	School Education on Disaster Risk Reduction	Making manuals for teachers
		Making manuals for students
		Making school curriculum
		Evacuation exercise

(3) The Organization in Responsible for Meteorological Observation and Forecasting

Tonga Meteorological Services (TMS), Ministry of Transport

Tonga Meteorological Services (TMS), Ministry of Transport is the organization responsible for meteorological observation and forecasting.

1) Current Situation

Current situation of Vanuatu Meteorological Services (VMS) is described in the following table. HF radio or telephone line (land line or mobile telephone line) are utilized for the data transmission from each observatories. The serious problem is that data transmission by the telephone line from two islands located in the northern part of Tonga (Niua Foaou and Niuatoputapu) is very unstable and only 10%-20% of observation data can reach the head office timely. The upper air observation has not been conducted at all. Ministry of Transport, the upper organization of VMS, is going to be unified with the Ministry of Labor and becomes Ministry of Infrastructure in July, 2012.

Table 2-68 Outline of TMS, Tonga

Numbers of Staff	28
Annual Budget	Approx. TOP0.85mil (¥4.42 mil, 2011)
Umbrella Organization	Ministry of Transport
Fiscal Year	July-June
Application Deadline of Annual Budget for Next Fiscal Year	February

Organization	
● Forecast	6
● Observation	26
● Climate	4
● Coastal Radio	4
● Operation & Maintenance	2
Head Office	Fuaamotu, Tongatapu
Observation System	3 shifts (24hours) Emergency case: 2 shifts (Increase personnel in case of emergency case)
Forecasting System	Normal: 3 shifts (8hours×2 person) Emergency: 2 shifts (12hours×4 person)
Adoption Plan for Climate Change	<ul style="list-style-type: none"> · Joint Action Plan for Climate Change and Disaster Risk Reduction · Ministry of Transportation Corporate Plan
Manned Synoptic Station	7 (Data Acquisition: Every 3 hours)
Automatic Weather System (AWS)	-
Automated Weather Observing System (AWOS)	-
Upper Air Observation	-
Transmitting Method of Observed Data to Head Office	Wireless Communication (SSB), Telephone Link, Mobile-phone Link
Forecast	Daily Weather Forecast (3 areas: 3 times/day) Coastal Weather Forecast (3 ocean areas: 3 times/day) Airport Weather Forecast obtained from Fiji RSMC
Distribution of Weather Information	Radio, Newspaper, Private companies
GTS	Disconnected Transmitting: The local observed data is transmitted to overseas through the connection with Wellington by e-mail Receiving : The observed data from overseas cannot be obtained.
Collection Method of Other Forecasts/Warnings	EMWIN: Satellite Data Receiving Equipment LRIT(Low Rate Information Transmission): MTSAT Receiving Equipment MetConnect Pacific and SATAID: Internet Regional Forecast from Fiji Regional Specialized Meteorological Center: Internet

2) Problems and Issues

Current problems and issues of TMS are described in the following table.

Table 2-69 Problems and Issues of TMS, Tonga

Field	Problems and Issues			Details
	Law/ Organization	Technology		
		Soft	Hard	
Observation	✓		✓	Since Upper Air Observation equipment is not procured due to lack of finance, upper air observation cannot be conducted.
	✓		✓	Since observation elements (only temperature measured by psychrometer and rain) except Tonga Tapu don't satisfy the standard of Synoptic Observatory (temperature, rainfall, wind direction & wind velocity, atmospheric pressure, humidity, sunshine duration and solar radiation).
Communication Analysis			✓	Since VMD has dependency on internet service of the local provider for obtaining the observed data from overseas, an alternative communication method considering internet stoppage in the emergency case is required.
			✓	Observed data from each observatory are not available timely since fixed telephone lines and mobile phone lines are unstable.
Analysis		✓	✓	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.
Forecast		✓	✓	NWS cannot forecast appropriately due to no upper air observed data, insufficient number of surface observation points and observed data.

Distribution of Information	✓		✓	Since the number of staff is limited and the distribution methods are not automated and different between each user (Website, e-mail, SMS, Fax), information distribution work is not conducted effectively and timely.
			✓	The observed data from overseas cannot be obtained since GTS is not connected.

3) Proposed Assistance

Based on the present conditions and the problems mentioned above, the following assistance combined with provision of equipment and technical cooperation is proposed. Especially it is necessary to provide the upper air observation and airport weather observation as soon as possible since these are not currently conducted at all.

Table 2-70 Proposed Assistance for Meteorological Observation and Forecasting in Tonga

No	Proposed Assistance	Items with Priority
1	Strengthening of Meteorological Observation System (Provision of Equipment)	Airport Weather Observation System
		Wind Profiler
		Meteorological Data Management System
		Meteorological Satellite Data Receiving System
		Early Warning System
		Meteorological Data Analyzing System
2	Capacity Building of Meteorological Observation and Forecasting (Technical Cooperation)	Equipment operation and maintenance
		Data quality control
		Weather information dissemination
		Weather forecasting

(4) The Organization Responsible for Earthquake and Tsunami Observation

Geological Service Unit (GSU), Ministry of Lands, Survey and Natural Resources

Geological Service Unit (GSU), Ministry of Lands, Survey and Natural Resources is responsible for earthquake and tsunami monitoring in Tonga.

1) Current Situation

Tonga and Fiji share the earthquake data through satellite network system established by JICA's technical cooperation that started on 2007. It has made it possible to pin-point epicenters with high accuracy over the broad area.

At this moment one sea level gauge in Nuku'alofa is operated. It was installed by AusAID. The monitored data is directly sent to Australia and GSU monitors the data through internet web site. The current situation of GSU is summarized as follows.

Table2-71 Outline of GSU, Tonga

Number of Staff	7
Annual Budget	TOP 0.5mil (¥ 26mil)
Organization	Ministry of Lands, Survey and Natural Resources
Fiscal Year	July ~ June
Deadline of Budget Proposal for the Next Year	Between April and May
Technical Staff	1 principal geologist

Head Office	Nuku'alofa
Observation System	Single shift (08:30~16:30)
Adaptation Plan for Earthquake and Tsunami	Nil
Monitoring Station	5 stations installed by JICA: Nuafoou Isl., Niuatoputapu Isl., Vavau Isl., Haapai Isl., Tongatapu Isl.
Type of Seismograph	Broadband Seismometer : 5 stations (shown in above column) Accelerator: 1 (Tongatapu) Intensity Display Unit: 3Units
Transmitting Method of Observation Data to Head Office	Transferring through satellite network from Nuafoou Isl., Niuatoputapu Isl. (this data shared by Fiji) Monitoring station of Haapai Isl. and Tongatapu Isl. are out of operation (breakdown).
Criteria for Intensity of Earthquake	Not yet established
Sea Level Gauge	Operation at Nuku'alofa : Installed by South Pacific Sea Level and Climate Monitoring Project (SPSLCMP) by Australia
EMWIN	Nil
GTS Network	Nil
Reporting	Formulating monthly report and quarterly report
Collection Method of Other Forecast/Warning	Receiving tsunami warning information from PTWC through e-mail and fax
Others	

Figure below shows notification process of tsunami warning.

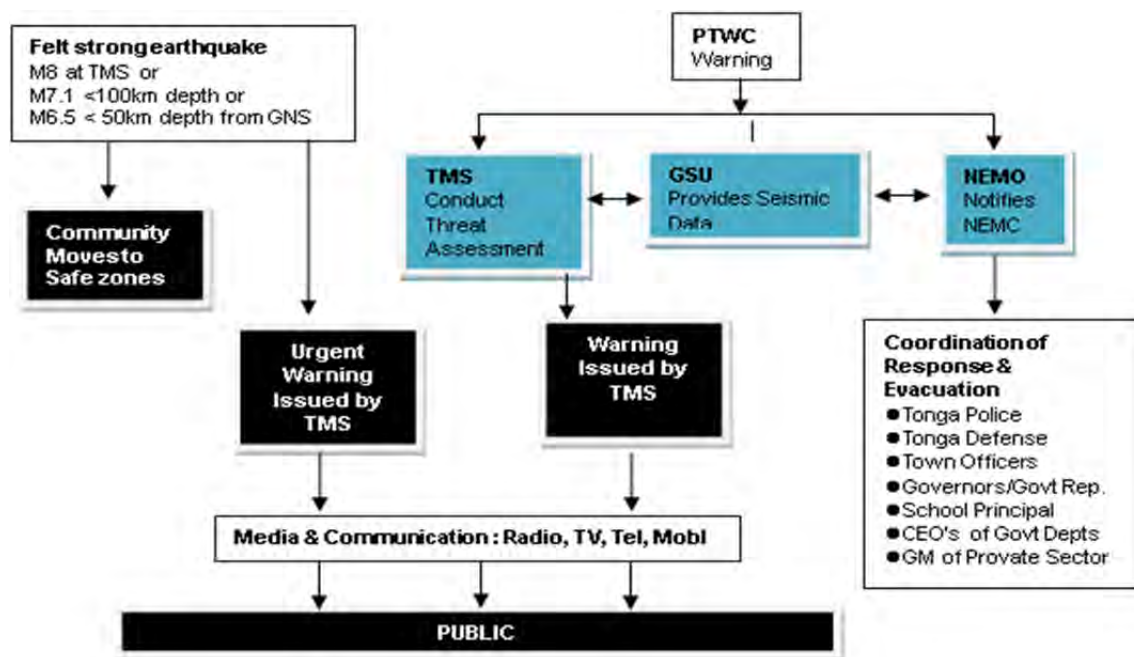


Figure2-22 Notification Process of Tsunami Warning (Summary & Tentative), Tonga

Tonga is not the member country of CTBT (Comprehensive Nuclear Test Ban Treaty).

There are few volcanoes including underwater volcanoes which are not active. Only volcano at Nuafoou Is.. is entering in 50 years eruption cycle in near future. GSU is monitoring volcanic activities by seismometer in Nuafoou Isl.

2) Problems and Issues

The following table summarizes the current problems and issues of GSU.

Table2-72 Problems and Issues of GSU, Tonga

Field	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation	✓			Monitoring of earthquake is not conducted by 24 hours shift (only in the daytime) due to shortage of staff and budget. It is impossible to issue early warning during non-operation time.
Communication			✓	Receiving far-earthquake information issued by international organizations through internet connection supplied by the local provider. It has weakness (the line is easily cut) in case of disaster. Taking this situation into account, other alternative back up network system is necessary.
Analysis		✓		Can't analyze and judge the possibility of tsunami caused by earthquake
		✓	✓	Lack of technology and facilities for the analysis
Distribution of Information	✓			Notification of earthquake and tsunami to the public through national radio service, but most of remote islands are not serving radio broadcast
Others	✓			Only 1 dedicated staff is assigned in GSU. It is difficult to maintain equipment in remote areas.

3) Proposed Assistance

Table below shows proposed assistance for earthquake and tsunami monitoring.

It is highlighted that installation of sea level gauges at remote islands is important for monitoring near-earthquake that may cause tsunamis. It is most effective for early evacuation.

Table2-73 Proposed Assistance for Earthquake / Tsunami Observation, Tonga

No	Assistance	Items with Priority	
1	Supporting Project of Tsunami Monitoring	Installation of sea level gauges for monitoring tsunami	
		Data transmitting facility to send sea level data	
		Installation of EMWIN-II for receiving tsunami information from PTWC	
2	Supporting Programme for Proper Operation of GSU	Operation / Maintenance	Making operation and maintenance manuals for equipment
			Making inventory/registration book for equipment
			Making technical specifications and procurements including spare parts list
			Training of technical staff for maintenance
		Monitoring / Analysis	Procurement and calibration of monitoring equipment
			Training of data analysis accuracy and notification method
			Training of communication technology for notice to the public
			Training of filing technology for data archive
Establishing technology/methodology to identify earthquakes that may cause tsunamis.			
3	Community Disaster Management Project	Community education programme for mutual support and SOP prepared by participation of communities to mitigate damages caused by earthquake, tsunami and cyclone.	

(5) The Organizations Responsible for Cyclone and Flood Control

(5-1) Ministry of Works and Disaster Relief Activities (MOW)

1) Current Situation

Ministry of Works and Disaster Relief Activities is responsible for cyclone and flood control. However, there is no staff specialized in this area and budgeting is not sufficient. At present, no action has been taken.

2) Problems and Issues

As urbanization progresses in the capital, Nuku'alofa, water holding capacity of the basin decreases and flood occurs more frequently. However, there is no engineer who can tackle to this problem. There is no organization that is capable of studying countermeasures either.

(5-2) Planning and Urban Management Agency (PUMA), Ministry of Land, Survey and Natural Resources

1) Current Situation

Planning and Urban Management Agency (PUMA), Ministry of Lands, Survey and Natural Resources has responsibility for urban planning and land use control to respond disaster prevention of cyclone/flood.

PUMA was newly established on 2007 with 17 staffs (permanent 8, temporary 3, project in charge 6). Annual budget is allocated approx. TOP 0.12mil (¥ 6.3mil) only including staff salary.

Since May 2010, and "Urban Planning Guideline", for land use control, and disaster early response, supported by EU was commenced. Before making this Guideline approved, "National Spatial Planning and Management Act" is required to be effective. Formulation of the Act is targeted to be completed in June 2012, assisted by ADB. It is expected that cabinet approval will be obtained within 2012 because this 1st Draft was concluded in 2010.

In parallel to this task, formulation of hazard map for capital city Nukualofa is ongoing. The East Japan Monstrous-Earthquake triggered this action. The draft has been completed as Flood Reduction Strategy-Draft This is aims to reduce vulnerability on flood prone areas within the grater Nukualofa urban area. In this draft, the flood area, the evacuation area, the evacuation routes, and the alternative evacuation routes for tsunami are considered.

Consolidation of the setback area from the seashore, land use, and building height control are expected to be specified in the urban planning issue. The natural disaster in Tonga is not limited to earthquake /tsunami/ flood. Buildings collapses with the strong wind of cyclones. It's required to formulate seismic resistant code and building height control.

2) Problems and Issues

In order to reflect such policy to the development of the nation, professionals with knowledge on DRR and urban engineering are essential. However such manpower is not available in Tonga.

(5-3) Proposed Assistance

As organizations related with flood control, Tonga Meteorology Service conducts rainfall observation, Ministry of Works and Disaster Relief Activities conducts construction of structures, and PUMA conducts urban planning. However, flood control has never been put into practice. The major problems in flood control are that there is no organization solely responsible and that, there is no national staff with the professional knowledge. It is necessary to analyze the cause of flood phenomena and to make countermeasures. For this purpose, integration of organizations, capacity development of the staffs and budget allocation are needed. The assistance is proposed as follow.

Table 2-74 Proposed Assistance for Cyclone and Flood Control, Tonga

No.	Proposed Assistance	Priority Tasks
1	Engineer Training for Cyclone and Flood	Training for arrangement and analysis on disasters
		Training on measures for disasters
		Education program (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)
		Rehabilitation works
		Flood management, sediment control
		River engineering (Structural measures, Non-structural measures)
		Cost estimate for river engineering
		Preparedness and response for floods
2	Integrated Water Resources Management (IWRM), Integrated Flood Management (IFM)	Water resources development plan (Water resource potential, Drought)
		Lan use plan, Flood management plan (Flood control plan, Run-off analysis)
		River improvement plan (Design discharge, River improvement plan, River management plan, Non-structural measures)
		Set up of water level for the warning
3	Capacity Building, Foundation of New Organization	Foundation of flood protection section and training center
		New legal system (River law, Water resources development law, Sediment control law)
		Foundation of local division
		Employment of civil engineers and capacity building
		Budget
4	Non-structural Method	Assistance for equipment and buildings
		Making of hazard maps Monitoring equipment, Simulation techniques

(6) Information and Communication System

1) Current Situation

In Tonga, mobile tele-density is about 60%. It is higher than other countries in the region. Major islands are connected through satellite network and it provides stable connection. While landline are disconnected, cellphone network or HF radio network is utilized.

For TV programs, there are three (3) channels that are licensed. Tonga TV (state-run broadcast) has two (2) channels and religious broadcasting network has one (1) channel. Actually, only Tonga TV is broadcasting TV programs. Radio stations such as A3Z and TBC, have radio programs on FM/AM by

twenty-four (24) hours. Tsunami warnings are expressed through radio network. TV's air time and coverage area is limited. Therefore, TV is not major way to receive disaster information.

Ministry of Information and Communication (hereafter MIC) is now developing Disaster which is communication liaison system. This system will help data gathering and issuing warning for communities in the time of disaster. Currently, this is implemented as a pilot project. With assistance from APT (Asia Pacific Tele Community), capacity building of IT engineers, system development on cloud environment and remote siren system for warning will be implemented.

On the other hand MIC doesn't have team to manage network between ministries. Each ministry manages their own network environment with ISPs (Internet Service Provider). Therefore, communication environment are not managed by an integrated manner. In near future, MIC will consolidate ICT units in each ministry and reorganize inter ministry network. But it is yet to be a concrete strategic plan. In addition, there are very few staff who masters ICT in ministries. Human resources from outside such as NGOs are invited in limited areas.

2) Problems and Issues

In Tonga, information sharing among disaster relevant organizations are lacking in human resources. It is under less efficient governing structures. For example, during night time, Tonga Meteorological Services (TMS) monitors earthquake since TMS has twenty-four (24) hours monitoring personal, while Geological Service Unit is originally responsible for monitoring the information.

Table 2-75 Problems and Issues in Information / Communication System, Tonga

Field	Problem and Issues			Details
	Law / Organization	Technical		
		Soft	Hard	
Information Sharing System		✓		In general, IT literacy in each agency is not mature. Human resources who can utilize ITC is very few.
	✓			For communication liaison and coordination, NGO or other external resources are not utilized.
	✓			There is no body to manage inter-ministry network. Therefore, there is no gain in experience. Also, it is difficult to develop infrastructure by mid and long term range.
Emergency Warning System			✓	Some institutes don't have 24 hours monitoring personal. There is no semi-automated warning system to assist rapid responses.
		✓		Currently, reorganization of government ministries. Therefore, preparation of SOP is still halfway to finish. Channel of communication is yet efficient.
		✓		Disaster education for local resident is not enough. Therefore, evacuation behavior is sometimes insufficient.
	✓			Experts who work for observation and warnings are scattered all around the country. Therefore it is difficult to improve monitoring level.

3) Proposed Assistance

According to above mentioned issues, following assistance can be proposed for Tonga.

Table 2-76 Proposed Assistance for Information / Communication System, Tonga

No.	Programme	Tasks
1	Capacity Development for Information Sharing during State of Emergency	Formulation of inter-government network development plan
		Capacity development for Emergency response dispatched personal
		Governmental institutes officials' IT literacy improvement
2	Development of Communication Network	Network connection between observing institutes and mass media.

(7) Other Organizations

Ministry of Environment and Climate Change

Ministry of Environment and Climate Change (MECC) is responsible for environmental conservation and countermeasures against climate change. It evaluates EIA (Environmental Impact Assessment) required for development and building planning..

1) Current Situation

MECC conducts its works based on Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010-2015. The works are categorized as follow;

- Technical & Sustainable Development
- Environmental Conservation
- Climate Change
- Energy

The number of staffs assigned to carry out the works is only 3.

2) Problems and Issues

Lack of staff and budget is the major problem. One of the issues is the flood control in Nuku'alofa. MECC tackles to this with MOW. However, planning of its countermeasures is difficult as engineers specialized in this affaire are not available.

2.2.6 Samoa

(1) Policy, Administration and Organizations

1) Current Situation

Disaster and Emergency Management Act was stipulated on 2007. Samoa's National Action Plan for Disaster Risk Management Plan, 2011-2016, is now in effective at present.

Based on the Act, National Disaster Council (NDC) is the supreme decision maker. Under NDC, Disaster Advisory Committee (DAC) has been set up. DAC consists of 4 sub-committees; Preparedness, Disaster Risk Reduction(DRR) , Response, and Recovery. On local level, in each of 362 villages of the nation, village councils are organized. Village councils are connected with community groups, such as schools, churches, NGO, women committees, and private sectors. Village councils are organized in 50 villages at present. Making disaster management plan on village level is progressing.

For coordination of the disaster management, Disaster Management Office (DMO) has been instituted. During disaster occurrence, National Emergency Operation Center (NEOC) is set up. Staffs of DMO and relevant agencies are gathered to the Center and conduct coordination under direction of NDC. New building for the Center is going to be built with the assistance by SOPAC, next year.

Disaster management plans for tsunami and cyclone are completed as follow.

- a) Samoa National Tropical Cyclone Plan, 2006
- b) Samoa National Tsunami Plan, 2006 (reviewed on 2008)

Meteorology Div. has prepared SOP for warning of cyclone and tsunami.

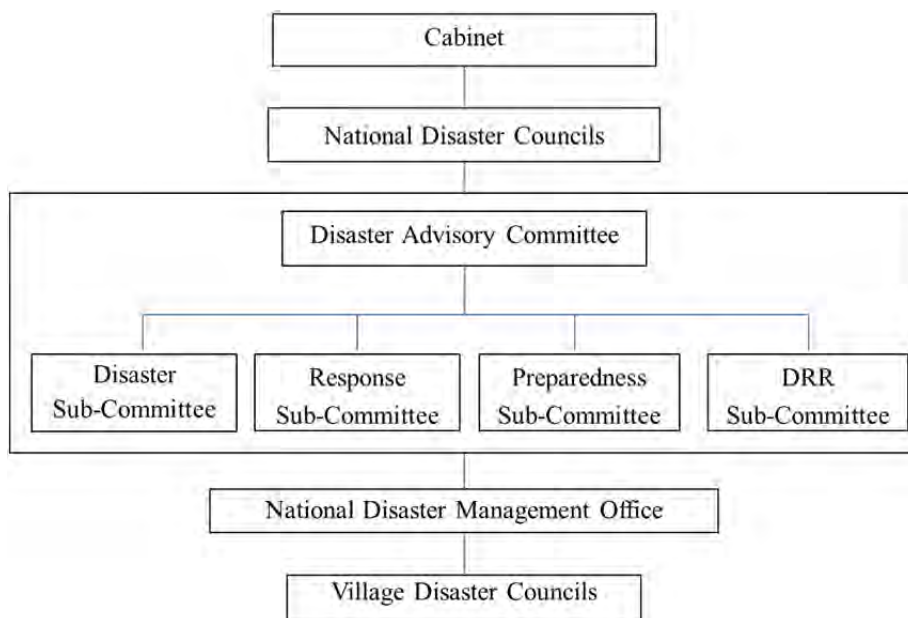


Figure 2-23 Administrative Chart of Disaster Management on National Level, Samoa

Activities for disaster management are assigned to the organizations shown below.

Table 2-77 Organizations Responsible for Disaster Management, Samoa

	Preparedness	Immediate Response	Rehabilitation, Reconstruction
Earth Quake Tsunami	Geophysical Section, Meteorology Div.	① NDMO ② Organization responsible for the properties/areas	Organization responsible for the properties/areas
Cyclone, Flood and Landslide	① Land Management Div. ② Planning and Urban Planning Agency	do	do

2) Problems and Issues

Urban drainage is needed in Apia since urbanization is progressing. Disaster caused by high tide occurs along coastal zone. However, administration for these disasters is not integrated. Meteorology Div. has SOP, while SOP is not prepared in other organizations or villages.

3) Proposed Assistance

Table 2-78 Proposed Assistance for Administration and Organizations, Samoa

No.	Proposed Assistance	Items with Priority
1	Capacity Development of Organizations Against Cyclone and Flood	Integration of organizations concerned with high tide and flood Education of staffs in costal/river engineering
2	Making of SOP	Making of SOP for national organizations and villages.

(2) The Organization Responsible for Disaster Management

Disaster Management Office (DMO), Ministry of Natural Resources and Environment (MNRE)

Disaster Management Office (DMO), Ministry of Natural Resources and Environment (MNRE) is responsible for disaster management on national level.

1) Current Situation

3 staffs are officially assigned to DMO. During disaster occurrence, National Emergency Operation Center (NEOC) is set up. In NEOC, DMO members coordinate the staffs gathered from relevant organizations. Organization chart of NEOC is shown below.

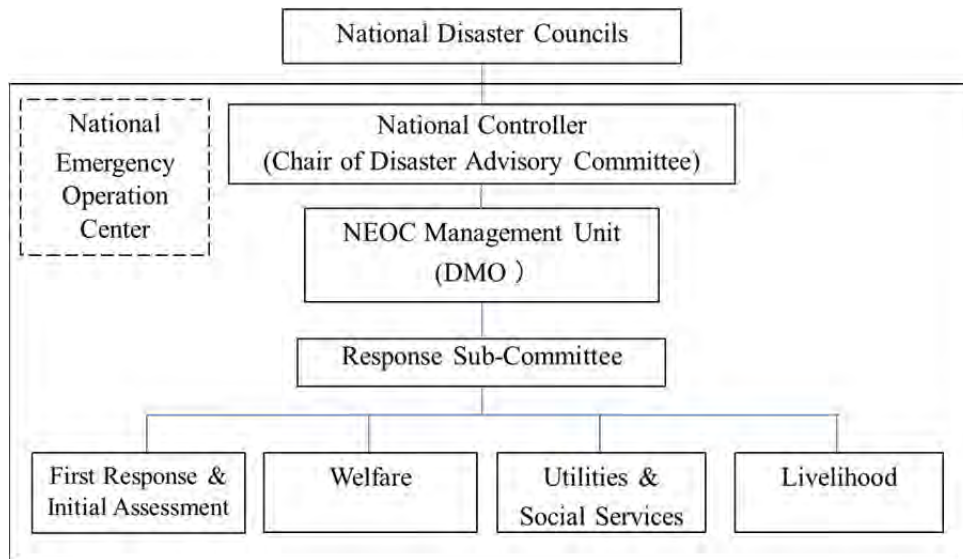


Figure 2-24 Organizational Chart of NEOC, Samoa

Meteorological Div. monitors weather and tsunami information in 24 hrs shift. Urgent information is reported to media directly from the division, not through DMO. Radio broadcasting, TV and SMS are used for communication. SMS is used by village chiefs, school principle, and church pastors, and the information is transmitted to the villagers by church bells and etc. Urgent siren system was installed along coastal zone at 23 points on 2009, by assistance from NZAP. The system can be set alert with operation at DMO office at Apia.

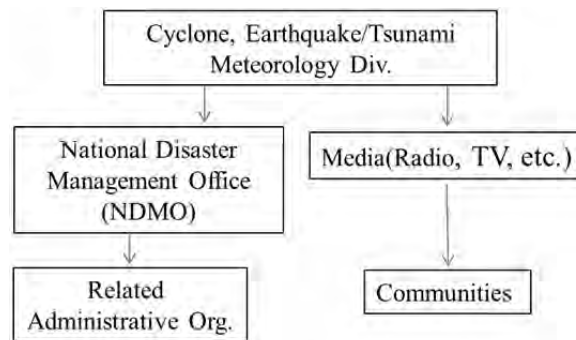


Figure 2-25 Transmission of Disaster Information, Samoa

Disaster education is programmed in the curriculum of both primary and secondary schools. Evacuation manual has been prepared for schools. These programmes and manuals are being reviewed to be applied to non-formal education. At 8 sites, tsunami hazard maps were prepared and workshops were held by NZAP, for community education.

2) Problems and Issues

- a) Although DMO is to work on preparedness and awareness, the progress is slow. SOP preparation and disaster education are not sufficient well taken care of. Budget scale is not sufficient enough for works to be done.
- b) Preparedness and awareness in communities are to be enhanced. DMO's capacity for urgent response is to be further strengthened.

3) Proposed Assistance

Preparedness and awareness in communities are to be enhanced, with limited budget and man power. Following assistance is proposed.

Table 2-79 Proposed Assistance for Disaster Management, Samoa

No.	Proposed Assistance	Items With Priority
1	Capacity Development of Staffs	Capacity of coordination during disaster occurrence. Preparedness. Countermeasures for disaster reduction.
2	Risk Management and Making of SOP	Making of SOP
		Education of nature of disaster, such as cyclone, earthquake, and tsunami
		Hazard and risk
		Evacuation shelter, evacuation route
3	Disaster Education	Places and areas with risks
		Making of manuals for risk reduction for schools and communities
		Exercise with manuals
		Making of school curriculum

(3) The Organization Responsible for Meteorological Observation and Forecasting

Observation / Forecast Section of Meteorology Division (SMD), Ministry of Natural Resources and Environment

Observation / Forecast Section of Meteorology Division (SMD), Ministry of Natural Resources and Environment is responsible for meteorological observation and forecasting.

1) Current Situation

Current situation of SMD is indicated in the following table.

Table 2-80 Outline of SMD (Observation / Forecasting Section), Samoa

Numbers of Staff	51
Annual Budget	WST1.3 mil (¥46.8mil, 2011)
Umbrella Organization	Ministry of Natural Resources and Environment
Fiscal Year	July-June
Application Deadline of Annual Budget for Next Fiscal Year	April-May

Organization	
● Observation/Forecast	15
● Climate	5 (Weather/Forecasting Section)
● Climate Change	2
● Geophysics Section	18
● Disaster Countermeasures	3
● General Affairs and Accounting	8
Head Office	Apia
Observation System	3 shifts (24hours) (Increase personnel in case of emergency case)
Forecasting System	2 shifts (01:00-17:00) 3 shifts (24hours, In case of severe weather and cyclones)
Adoption Plan for Climate Change	National Adaptation Programme of Action: NAPA (2005)
Manned Synoptic Station	3 (Data acquisition: every 3 hours)
Automatic Weather System (AWS)	4 (Data acquisition: every 10 hours, data record: every 1 hour)
Automated Weather Observing System (AWOS)	-
Upper Air Observation	-
Transmitting Method of Observed Data to Head Office	Wireless LAN, Mobile-phone Link
Forecast	Daily Weather Forecast (5 areas, 2 times/day) Coastal Weather Forecast (2 ocean areas: 2 times/day) Point Weather Forecast (8 points: 1 time/day) Tokelau Area Weather Forecast (2 times/day)
Distribution of Weather Information	Website, Radio, Newspaper
GTS	Disconnected Transmitting: The local observed data is transmitted to overseas through the connection with Wellington by e-mail Receiving : The observed data from overseas cannot be obtained.
Note	
Expansion Plan	AWS (7), AWOS (1), Wind Profiler (1), GTS Message Switch, Tidal Gauge, Wireless LAN Communication Network etc. are planned to be installed during May, 2012 under Japan. Japan's Grant Aid for environment.

2) Problems and Issues

Problems which SMD has had until now, such as shortage of an observation points, absence of an upper air observation, and acquisition difficulty of the weather product issued by advanced countries, are expected to be solved by the implementation of Japan's Program Grant Aid for Environment and Climate Change that will be completed by 2013. After that, establishment of information network for data sharing of observed data in Samoa are remain as issue.

3) Proposed Assistance

As observation capability is strengthened in other countries of the Region, formulation of a network for sharing the information is needed.

(4) The Organization Responsible for Earthquake and Tsunami Observation

Geophysical Section, Meteorology Division, Ministry of Natural Resources and Environment

Geophysical Section of Meteorology Division (SMD), Ministry of Natural Resources and Environment (MNRE) is responsible for earthquake and tsunami monitoring.

1) Current Situation

Current situation of SMD is indicated in the following table. Geophysical Section of Meteorology Division conducts seismic observation by one existing seismometer installed by USGS and seismometers installed under assistance project implemented last fiscal year by China. The assistance from China includes: Broadband seismometer + accelerometer, 3 sets and short period seismometer, 3 sets.

Table 2-81 Outline of SMD (Geophysical Section), Samoa

Numbers of Staff	51
Annual Budget	WST1.3 mil (¥46.8mil, 2011)
Umbrella Organization	Ministry of Natural Resources and Environment
Fiscal Year	July-June
Application Deadline of Annual Budget for Next Fiscal Year	April-May
Organization	
● Observation/Forecast	15
● Climate	5
● Climate Change	2
● Geophysics Section	18 (Geophysical Section)
● Disaster Countermeasures	3
● General Affairs and Accounting	8
Head Office	Apia
Observation System	8 hrs. (09:00-17:00) * intended to be 24 hours in future.
Type of Seismometer	Broadband Seismometer : 1 set (installed and maintained by USGS) Broadband Seismometer + Accelerometer : 3 sets (provided by China) Short period Seismometer : 3 sets
Transmission method of observation data	Analog Radio
Intensity Scale	Nil
EMWIN Receiver	Nil (installed at Met. Office)
GTS	Nil (will be installed at Met. Office)
Dissemination of Earthquake information	If distance from epicenter to Apia is less than 1000km and magnitude is more than 7, Geophysical Section will inform to media directly. In other cases, it will be conducted according to the situation.
Other earthquake information source	Nil

2) Problems and Issues

Current problems and issues of SMD are indicated in the following table. Although observation network is provided by assistance of China, establishment of maintenance system and stable operation system will take certain time, since SMD has a no experience on maintenance of seismic observation equipment nor operation of networks.

Table 2-82 Problems and Issues of Meteorology Division (Geophysical Section) ,Samoa

Activities	Problems and Issues			
	Law/ Organization	Technology		Details
		Soft	Hard	
Observation	✓			Monitoring of observation data is not carried out in 24 hours, but only standard working time, due to insufficient number of staff. Therefore, there is a possibility of delayed dissemination of earthquake information in case that earthquake occurs out of standard working time.

Communication				-
Analysis		✓	✓	The technique of predicting tsunami from the earthquake is not established.
Distribution of Information				-
Others				-

3) Proposed Assistance

Based on the present conditions and the issues mentioned above, the following assistance is proposed.

Table 2-83 Proposed Assistance for Earthquake and Tsunami Observation

No	Proposed Assistance	Priority Issue	
1	Strengthening of Tsunami Observation System (Provision of Equipment)	Provision of Sea Level Gauges	
		Sea Level Data Communication System	
2	Capacity Building of Earthquake and Tsunami Monitoring (Technical Cooperation)	Equipment Operation and Maintenance	Production of manuals on observation instruments and data communication equipment maintenance and management.
			Production of record book on observation and data communication equipment maintenance and management record book
			Preparation of consumables & spare parts list including technical specification and detailed procurement plan
			Practice training of countermeasures, fault finding, remedy and recovery against abnormal conditions
			Adjustment and correction of the observation instruments
		Observation and Analysis	Acquirement of the method and technique of predicting tsunami from the earthquake is not completed.
Communication	Network construction for transmitting the observed earthquake information to outside the country		

(5) Organization Responsible for Cyclone and Flood Control

(5-1) Water Resources Division, Ministry of Natural Resources and Environment

1) Current Situation

Water Resources Division (WRD), Ministry of Natural Resources and Environment conducts hydrological observation, rainfall and river water level, for water resources development. Flush flood occurs in 4 rivers in Apia. However, no countermeasures are taken for this problem.

Table 2-84 Outline of WRD, Samoa

Annual Budget	WST0.35mil (¥12.6mil, 2011)
Organization	Ministry of Natural Resources and Environment
Sections and number of staffs	Hydro. Section 7 Watershed Section 6 with 20 workers Policy Regulation Section 4
Rain-gauge Station	13
Water Level Station	17

Water Resources Division was instituted on 2008, and is composed of 3 Sections. Hydrology Section conducts observation of rainfall and water level. Watershed Section conducts planning and control of the basin conservation. Policy Regulation Section does water use control and permission issue. In the Division, there is only one graduate of faculty of engineering, who majored in mechanical engineering. Graduates from civil engineering go to Samoa Water Authority that offers much higher salary.

The hydrological observation is totally for water use. The system are not telemeterized due to mountainous topography. The hydrological observation commenced on 2008.

For basin conservation, Watershed Management Plan is under preparation. This aims at conservation of water holding capacity of the basin and water quality control. Water Resources Management Project is being implemented with Global Environment Facilities. This project will contribute to flood control as the water holding capacity of the basin is conserved, however its original purpose is water resources conservation.

2) Problems and Issues

- a) Accumulated data will contribute to flood control and landslide countermeasures. However, there is no professional for such problems.
- b) There is no plan to continue the observation to accumulate the data.
- c) Basin conservation is effective not only for water resources development but also for flood control. It is needed to extend this pilot project to the whole nation. For this, Watershed Management Plan is needed to be stipulated to set up legal status.

(5-2) Land Management Division, Ministry of Natural Resources and Environment

1) Current Situation

Land Management Division, Ministry of Natural Resources and Environment is responsible for land development permission zone sand mining permission on coastal zone, and construction of costal/river structures. The division is composed of 5 Sections and total number of its staffs is 27.

Table 2-85 Outline of Land Management Division, Samoa

Name of Sections	Activities
Evaluation	Evaluate the prices/value of the land
Development	Issue permission for land development and sand mining
Administration	Lease of land owned by the nation
Registration	Land registration
Project	① Implementation of Coastal Zone Management Project ② Planning and construction for costal and river embankment protection

Development Section conducts land use permission. There is no legal control on land use for zones along sea cost and rivers for DRR.

Project Section conducts costal protection works for erosion control. Government Rehabilitation Scheme that is implemented with national budget, WST 3mil (¥108mil) have been budgeted for 2010

~2012. As assistance from donors, Coastal Zone Management, Pacific Adaptation to Climate Change is being implemented with GEF of World Bank. There is only one staff in this section on contract base.

2) Problems and Issues

- a) Frequency of flood occurrence and its scale will increase, as development in Apia and its upper basins proceed. Therefore flood control will be more important. High tide due to cyclone is also a problem.
- b) There is only one staff in the Project Section. Staff specialized in costal/river engineering is necessary to be assigned.
- c) In land use control, disaster risk reduction around coastal zone and rivers should be taken into account.

(5-3) Planning and Urban Management Agency, Ministry of Lands, Survey and Natural Resources

Planning and Urban Management Agency (PUMA) ,Ministry of Lands, Survey and Natural Resources is responsible for urban planning. PUMA makes land use planning and drainage planning for flood control.

(5-4) Ministry of Works, Transport, and Infrastructures

Ministry of Works, Transport, and Infrastructures is responsible for issuing permission in building, maritime, aviation, land transport, but does not conduct construction of infrastructures for disaster risk reduction. Total number of the ministry is about 40.

(5-5) Proposed Assistance

As organizations related with flood control, Meteorology Div. conducts rainfall observation, Water Resources Div. conducts rainfall / water level observation, Land Management Div. conducts construction of structures, PUMA conducts urban planning and NDMO conducts disaster management such as evacuation. The major problems in flood control are that there is no organization solely responsible and that, there is no national staff of the profession. It is necessary to analyze the cause of flood phenomena to make countermeasures. For this purpose, integration of organizations, capacity development of the staffs and budget allocation are needed. The assistance is proposed as follow.

Table 2-86 Proposed Assistance for Flood Control, Samoa

No.	Proposed Assistance	Items with Priority
1	Engineer Training for Cyclone, and Flood Control	Training for arrangement and analysis on disasters
		Training on measures for disasters
		Education program (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)
		Rehabilitation works

		Flood management, sediment control
		River engineering (Structural measures, Non-structural measures)
		Cost estimate for river engineering
		Preparedness and response for floods
2	Integrated Water Resources Management (IWRM), Integrated Flood Management (IFM)	Water resources development plan (Water resource potential, Drought)
		Land use plan, Flood management plan (Flood control plan, Run-off analysis)
		River improvement plan (Design discharge, River improvement plan, River management plan, Non-structural measures)
		Set up of water level for the warning
3	Capacity Building, Foundation of New Organization	Foundation of flood protection section and training center
		New legal system (River law, Water resources development law, Sediment control law)
		Foundation of local division
		Employment of civil engineers and capacity building
		Budget
		Assistance for equipment and buildings
4	Non-structural Method	Making of hazard maps
		Simulation techniques

(6) Information and Communication System

1) Current Situation

In Samoa, cellphone network covers whole islands. Cellphone subscription per 100 populations is 91.4. It shows use rate of cellphone is very high. Also, in 2009 the undersea cable from American Samoa was connected Samoa. Therefore Samoa has stable internet connection environment. In addition, in Apia area, not only copper line network has been utilized but also fiber-optic cable network has been developed. So communication networks are redundant. Currently, cellphone network and VHF radio network are utilized while landline is disconnected.

Samoa has three (3) TV stations to broadcast programs. But radio network is more popular. State-run broadcasting station 2AP has one (1) antenna tower to transmit AM radio wave and covers whole nation. 2AP's airtime starts from 6:00am until 11:00pm for sixteen (16) hours. Between airtime, drivers are stand ready for emergency. In general, within fifteen (15) to thirty (30) minutes, the radio will be able to express emergency bulletin.

NEMO is utilizing ALERTS (Automated Live Emergency Response Telecommunications System) which automates information gathering and express warning. ALERTS consists of information gathering system using cellphone network services and siren system covering southern part of the main island. On the other hand, state-run broadcasting radio 2AP has decrepit equipment and there is no backup equipment. As 2AP is using old broadcasting equipment, there is not much room to speed up their information service such as automating workflow.

2) Problems and Issues

In Samoa, information sharing system among disaster relevant institutes is effective and it has a future development plans. In general it is in good shape.

Table 2-87 Problems and Issues in Information / Communication System, Samoa

Field	Problems and Issues			
	Law / Organization	Technology		Details
		Soft	Hard	
Information Sharing System			✓	State-run broadcast 2AP only has decrepit equipment. Currently 2AP doesn't have backup site during disaster.
	✓	✓		In general IT literacy is immature. There are lack of human resources who utilize ICT. In order to collect farther detailed first-order information, it is required to have strategic plan to generalize advanced IT equipment such as smartphones, tablets and PCs.
Emergency Warning System			✓	Radio station 2AP does not broadcast program for 24 hours and no semi-automated workflow to express emergency warnings.
		✓		Other than Meteorological Services SOP is yet to prepared.
	✓	✓		Disaster education for local resident is not enough. Therefore, evacuation behavior is sometimes insufficient.

3) Proposed Assistance

According to above mentioned issues, following assistance is propose for Samoa.

Table 2-88 Proposed Assistance for Information / Communication System, Samoa

No.	Programme	Tasks
1	Capacity Development for Information Sharing During Emergency	Preparation of equipment and dispatch plan for remote islands
		Capacity development for emergency response dispatched personal
		Governmental institutes officials' IT literacy improvement
2	Broadcast equipment development	Radio broadcasting equipment renewal and normalization of 24 hours broadcasting service

(7) Other Organizations

Building Management Div., Ministry of Works, Transport and Infrastructure

Building Management Div., Ministry of Works, Transport and Infrastructure is responsible for building permission. But the division does not conduct construction of infrastructures for DRR. The division consist of 2 sections and 11 staffs including 6 building inspectors. Building Code was stipulated on 2002. The structure with resistance for seismic force is taken into account.

2.3 Regional Bases

2.3.1 International Tsunami Information Center (ITIC) / National Oceanic and Atmospheric Administration (NOAA) / Pacific Tsunami Warning Center (PTWC)

(1) ITIC / NOAA

International Tsunami Information Center (ITIC) was established in 1965 under Intergovernmental Oceanographic Commission (IOC) that belongs to UNESCO. ITIC is managed by UNESCO/IOC and conducts an important role for reducing disaster of tsunami in the Pacific.

As shown in the figure below, ITIC is an international agency under UN. National Oceanic and Atmospheric Administration (NOAA), is a department to manage ocean and atmosphere under U.S. Department of Commerce. NOAA corresponds to Japanese Meteorological Agency and Hydrographic/Oceanographic Department of Coastal Guard. NOAA creates partnership with ITIC and shares an office. Their activities are integrated.

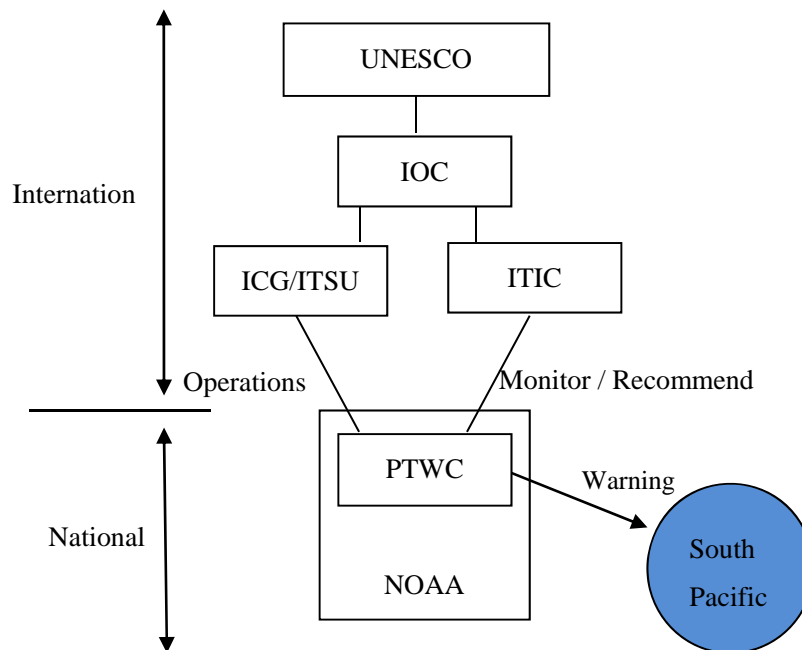


Figure 2-26 ITIC, NOAA, and PTWC

ITIC establishes International Tsunami Warning and Mitigation System (ITSU) not only in the Pacific Region but globally and monitors tsunami. ITIC also cooperates with non-governmental organizations such as International Red Cross, International Hydrographic Organization (IHO), UN International Strategy for Disaster Reduction (UN/ISRD) and other organizations related to disaster prevention.

Study on tsunami and development of human resource of member countries are main activities of

ITIC. ITIC tries to reduce damage from tsunami through implementation of technical training, holding of workshops/seminars and assessment of evacuation plans. In the Pacific, ITIC is operated in cooperation with Australia, New Zealand, and Meteorological Agency of Japan. These are linked by the network to meet the demands of transmission of information on disaster.

125 meteorological stations are in the Pacific that ITIC monitors. ITIC predicts cyclone using information obtained from the stations. The University of Hawaii is the center of forecast information. Information on meteorological observation is delivered by Emergency Managers Weather Information Network (EMWIN). After improvement of transmission speed of broadcast to 19.2kbps, it has been possible to deliver tsunami warning in 1 minute, forecast in 5 minutes and display in 5 to 10 minutes.

NOAA consists of following 6 departments.

- 1) Department of Ocean and Atmospheric Research
- 2) Department of National Environmental Satellite, Data and Information Services
- 3) Department of National Ocean Service
- 4) Department of National Weather Service
- 5) Department of Program Planning and Integration, and
- 6) Department of National Marine Fisheries Service

Followings are the system and equipment that NOAA is now planning. These may be introduced to the Pacific.

- 1) Remote Asia Pacific Information Dissemination Broadcast (RAPID Cast)

RAPID Cast is a delivery system using existing World-Space and GEONET Cast for sending warning sign at remote area in the Pacific.

- 2) Chatty Beetle

Chatty Beetle is a portable communication tool with an internal battery. In case of emergency, character information can be sent and received through a satellite. It is under a three years test at present. After feeding back testing results, dissemination of Chatty Beetle will be decided.

(2) PTWC

Intergovernmental Coordination Group (ICG) was renamed Pacific Tsunami Warning and Mitigation System (PTWS) in 2005. 35 countries in the Pacific, the Indian Ocean and the Caribbean are members of PTWS. PTWS tries to reduce tsunami disaster through global observation and warning. Followings are member countries of PTWS.

Japan, USA, France, Australia, New Zealand, Canada, North Korea, South Korea, China, Russia, Vietnam, Indonesia, Malaysia, Philippines, Singapore, Thailand, Mexico, Columbia, Guatemala, Costa Rica, El Salvador, Panama, Ecuador, Chile, Nicaragua, Peru, Fiji, Niue, Papua New Guinea, Samoa, Solomon, Tonga, Tuvalu, Vanuatu and Cook Islands

Pacific Tsunami Warning Center (PTWC) functions as the head office to operate PTWS. PTWC identifies epicenter at the same time of earthquake generation and transmits warning sign to countries concerned. In addition, PTWC estimates information on course and arrival time of tsunami by computers and sends this information to countries near epicenter as stronger messages. Warning sign is renewed with time and is continued until disappearance of threat. New information of damage caused by tsunami is reflected to contents of warning sign continuously.

Two sets of monitoring system using exactly the same software are operated in parallel in the operation center of PTWC for backup function. More than two staffs monitor in 24 hours shift.



Figure 2-28 Marks Showing Monitoring Stations by PTWS (partial)



Figure 2-27 PTWC Operation Room:
operating 24 hours-7 days a week

(3) Issues on Tsunami in the Pacific

- 1) ITIC had cooperated to set up observation equipment in countries of Pacific region. However, there are some countries that cannot maintain the equipment supplied because of insufficient budget for maintenance. This situation should be improved. It is an issue of both sides – providers of assistance and recipients of assistance.
- 2) EMWIN for receiving information of earthquake was upgraded in Fiji, Solomon, Vanuatu and Marshall in 2011. EMWIN should be renewed and upgraded in remaining countries. However, specific effort to upgrade has not been planned yet. Upgrading of the equipment improves transmission speed and reliability and is effective to provide countermeasures against disaster.
- 3) On the other hand, management fund of ITCI has been cut down because of US's sanction against UNESCO. There is still opportunity to study on possibility of measures that Japan can support.
- 4) PTWC transmits information on earthquake and tsunami to member countries. But it does not have responsibility how to disseminate the information within the recipient countries. How to deliver information correctly and urgently to the communities is an issue.
- 5) More time is needed to do calculation for identification of epicenter if number of seismometers is increased. It is not always advantageous to improve accuracy, Balance is important. It is necessary to discuss the issue among countries in the Pacific to come to a conclusion.

- 6) Analysis of relationship between earthquake and occurrence of tsunami and propagation of tsunami is the main purpose of sea level gauges. These aspects should be considered for installation of sea level gauges.

2.3.2 University of South Pacific (USP)

University of South Pacific (USP) is an university founded and operated jointly by 12 countries in the Pacific. USP has following faculties and courses.

Table 2-89 Faculties and Courses in USP

Faculty	Course
Arts, Law and Education	School of Education, School of Law, School of Language, Arts and Media, School of Social Sciences, Institute of Education, and Oceania Center for Arts, Culture and Pacific Studies
Business and Economics	Graduate School of Business, School of Accounting and Finance, School of Land Management and Development, School of Economics, School of Government, Development and International Affairs, School of Management and Public Administration, School of Tourism and Hospitality Management, and School of Agriculture and Food Technology
Science, Technology and Environment	School of Geography, Earth Science and Environment, School of Marine Studies, School of Biological and Chemical Sciences, School of Computing, Information and Mathematical Sciences, School of Engineering and Physics, and Institute of Applied Sciences

Source; Home page of USP

USP has 14 campuses in 11 countries (Fiji, Samoa, Vanuatu, Cook Islands, Kiribati, Marshall Islands, Nauru, Niue, Solomon Islands, Tonga, and Tuvalu). Head office of USP is located at Suva in Fiji. USP extends remote-education through IT for students and graduate students in the Pacific.

Disaster Risk Management Course was opened as adaptation countermeasures to climate change in the graduate school in 2011. This course has a function as a research institute on disasters in member countries. The course conducts studies on improvement of administration in the field of disaster prevention. A vice president manages the course because disaster risk management is related to multi sectorial studies. Students from member countries will have roles for making and implementing plans on disaster prevention in their countries in the future. They will be able to communicate with each other by using common knowledge. It is said that such communication is effective to tackle to and solve common issues in the region.

Students in Disaster Risk Management Course conduct research and receive OJT on disasters occurring frequently caused by climate change. The course has typical themes such as flood, cyclone, earthquake / tsunami, and landslide. Students analyze impact and study technical countermeasures by types of disasters. USP implements collaborated activities in Disaster Risk Management Course with NDMO, SOPAC, UN agencies, International Red Cross and universities in the region such as Melbourne University, the University of Hawaii and University of Ryukyu, Japan.

Students from member countries in USP have difficulty to get financial support from their countries. Students, therefore, get support of travel cost, insurance, educational material, etc. from NZAP, AusAID, USAID and EU. USP intends to provide observation equipment such as sea level gauge,

seismograph and meteorological observation equipment to fulfill the course and to educate students practically through OJT in the future. USP, therefore, hopes support to the course from Japan.

A main campus in Fiji and branch campuses in other member countries are connected by internet. System that students in different campuses can take lessons in real time has already been operated. USP studied possibility to be a communication hub on disasters in the South Pacific. However, USP has many difficulties to be a hub such as poor infrastructure for communication and absence of working system of 24 hours in a day. Therefore, possibility of realization to be a hub may be realized in future.

Following table shows outline of courses of education and study on disaster risk management.

Table 2-90 Outline of Disaster Risk Management Course in USP

Module	Title and Objectives	Content (in brief)	Reading Materials (Non exhaustive)
M1	Presentation Definitions and Concepts a. Understand what is at stake b. Understand the terminology used in DRM	a. Overview and presentation of the course b. Introduction: why we need DRM? c. Definition of DRM terms d. List of Abbreviations	a. Katharina Thywissen (2006) . Components of risks – A comparative glossary. Studies of the University: Research, Counsel, Education (SOURCE) , Publication Series of the UNU-EHS, n°2/2006.
M2	Hazards Classification, Distribution and Trends a. Understand the different types of disasters b. Understand the geographical distribution and trends	a. Details on type of hazards, causes and occurrences/distributions (mapping) b. Trends – Which type of hazard that is occurring in which part of the world including the PICT? How often do they occur?	a. http://www.emdat.be/database b. Risk and poverty in a changing climate - Invest today for a safer tomorrow. 2009. 2009 Global Assessment Report on Disaster Risk Reduction. United Nations 2009.
M3	Risk, Vulnerability and impacts at global level a. Identify the risks associated with disaster, impacts and vulnerability at global level b. Recognize and understand impacts at global level	a. What is risk? What are the factors that affect risk? b. What is vulnerability? What are the factors that affect vulnerability globally, why vulnerable? c. What are the impacts of Disasters – Type of disasters and their impacts, socio-economic, cultural, physical, and others globally (Direct and Indirect) .	a. Smith K. Environmental hazards: assessing risk and reducing disaster. 2004. Routledge, New York, USA. b. Birkmann J. Measuring vulnerability to natural hazards. 2006. United Nations University.
M4	Risk, Vulnerability and impacts at regional level a. Identify the risks associated with disaster, impacts and vulnerability at regional level b. Recognize and understand impacts at global level	a. Define Risks and what are the risks associated with Disasters in a Pacific context b. Why PICT are vulnerable – geography, resources, economies, populations etc. Relation to Climate Change. c. What are the impacts of Disasters – Type of disasters and their impacts, socio-economic, cultural, physical, and others globally (Direct and Indirect) d. Explore how disaster events can cause internal displacement in the Pacific	a. Preparedness, Planning, prevention, assessment of National and Regional Efforts to Reduce Natural Disaster and Climate Change Risks in the Pacific. GFDRR (2009) . The World Bank / Synthesis Report / East Asia and the Pacific Region.

2.4 Regional Frameworks

2.4.1 South Pacific Applied Geo Science Commission (SOPAC)

The Pacific Islands Applied Geo Science Commission (SOPAC) is an intergovernmental, regional organization with members including Pacific island countries and territories, as well as Australia and New Zealand. The Commission was established in 1972 under the Economic and Social Division of the United Nations. It became SOPAC Division of Secretariat of Pacific Community (SPC) on 2011.

At present, SOPAC consists of 21 countries - American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall, Nauru, New Caledonia, New Zealand, Niue, Palau, PNG, Samoa, Solomon, Tokelau, Tonga, Tuvalu and Vanuatu. Head Office of SOPAC is located in Suva, Fiji. Principle purpose for establishing SOPAC is to maintain natural resources in the Pacific properly.

Present role of SOPAC is to realize autonomous development, poverty alleviation, and venerable community to disaster. To achieve the role, SOPAC supports technical development and formulation of development strategy for understanding of system of natural environment and for enhancement of environmental science, technology and knowledge for use of natural resources effectively.

Partnership network among members of SOPAC was developed in 2006 and “The Pacific Disaster Risk Reduction and Disaster Management Framework for Action 2005-2012: Building the Resilience of Nations and Communities to Disasters” was prepared jointly by SOPAC’s members and donor agencies. Around 400 donors including SOPAC’s members (18 countries), international donor agencies and NGOs participate in implementation of activities in line with the Action 2005-2012.

The action plan aims to formulate strong cooperative relations among members for reduction and/or control of disasters and to deal with difficulty by mutual complement of member countries of SOPAC. The action plan also has aspect to develop bond among members in its purpose.

In line with above mentioned, “Strategic Plan 2011 – 2015” was prepared for a new development policy in 2010. Following three programs are main targets in the plan.

1) Ocean and Islands Program:

It is for utilization and protection of marine resources. Urbanization and climate change are also targeted.

2) Water and Sanitation Program:

Program to maintain properly and utilize effectively all water resources such as rainwater, and surface/ground water

3) Disaster Reduction Program:

- a. Reduction of disasters and action to climate change
- b. Awareness of disaster risk management in the community level
- c. Reinforcement and improvement of administrative capabilities of and training programme for government agencies responsible for disaster
- d. Collecting, managing, filing and transmitting of basic data/information

e. Development of early-warning system, and

f. Preparedness for disaster and development/establishment of responsible organization to disaster

Regarding DRR, Community Risk Programme was commenced on 1995. This programme is composed of the 3 components:

- 1) Capacity development for disaster management
- 2) Disaster damage Reduction
- 3) Mainstreaming integrated disaster risk management

In capacity development for disaster management, the following points are stressed.;

- a. Formulation of organization for DRR on national level
- b. Regional training for law/acts stipulation
- c. Evaluation of preparedness and response
- d. Promotion of awareness in communities and enforcement of early warning

In disaster damage reduction, following points are stressed.;

- a. Hazard evaluation with scientific analysis
- b. Technical transfer

In mainstreaming integrated disaster risk management, following points are stressed;

- a. Introduction of integrated countermeasures
- b. Betterment of governance

Enforcement of organization of SOPAC which manages Pacific region is one of critical factor for cooperation to benefit whole region of South Pacific. Collection and organization of basic data and information for preparation of hazard maps of coastal area by using GIS, which is a main activity for disaster prevention, is now being developed. SOPAC intends to prepare hazard maps mainly focused on populated area in member countries in the future. However, laws and regulations and systems have to be prepared before preparation of hazard maps in some member countries. SOPAC has less human resources and funds to support provision comprehensively. A new support for expansion and enhancement of function of SOPAC is necessary.

In addition, SOPAC has a plan to divide South Pacific Region into three sub-regions under PTWC functioned as a regional center of earthquake and tsunami in Hawaii. A sub-regional center will be established in each sub-region for smooth management and transmission of information and data. Fiji, Tonga, Samoa, Vanuatu and some other countries are candidates for a sub-regional center. To secure facilities and equipment and to develop human resources are needed for establishing a sub-regional center. Operation of twenty four (24) hours a day throughout the year is indispensable as a receiver of information and data from PTWC. SOPAC has prospect to be able to develop around-the-clock-operations.

The table below shows ongoing programmes under SOPAC.

Table 2-91 On-going Programmes on Disaster Management by SOPAC

Programme	Major Tasks
Disaster Reduction Program (DRP)	DRP provides technical and policy advice and support to strengthen disaster risk management practices in PICs. DRP is linked to the global Hyogo Framework for Action 2005-2015.
Ocean and Islands Program (OIP)	To improve technical knowledge of Ocean and Islands ecosystem to the sustainable management of nature.
Water and Sanitation Program (WSD)	A long-term program of capacity building, advocacy and awareness in sustainable water management for PICs.
Technical Support Services (TSS)	Improve policy planning for natural resource economics. GIS and Remote sensing. Technical equipment and services. Data Management. Publications and Library

2.4.2 Secretariat of Pacific Regional Environment Programme (SPREP)

SPREP is the community organization established by Pacific countries for the purpose of the environmental development and environmental protection which can maintain the Pacific. Activity of SPREP is a promotion of regional cooperation against the problems relevant to the environment, and environmental conservation and improvement toward sustainable development in the Pacific. SPREP's members are American Samoa, Australia, Commonwealth of the Northern Mariana Islands, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall, Nauru, New Caledonia, New Zealand, Niue, Palau, PNG, Samoa, Solomon, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu and Wallis and Futuna. SPREP's activities are guided by its Strategic Action Plan 2011-2015. The Plan is composed of the following four strategic priorities;

- 1) Climate Change
- 2) Biodiversity and Ecosystem Management
- 3) Waste Management and Pollution Control
- 4) Environmental Monitoring and Governance

In these priorities, regarding climate change adaptation relevant to disaster management, SPREP is working for following three key sectors as;

- 1) Water Management
- 2) Food Security
- 3) Coastal Infrastructure

2.5 Donors and International Organizations

2.5.1 Australian Agency for International Development (AusAID)

- 1) The basic idea of AusAID for assistance towards the Pacific is as follow.
 - a) DRR (Disaster Risk Reduction) is important area of assistance from stand point of humanity.
 - b) Promotion of awareness is very necessary for DRR.
 - c) DRR in the Pacific is considered as a climate change adaptation. Preparedness for disasters is also important in this respect.
 - d) There are 20 development countries in the neighbor-hood of Australia. They are vulnerable in flood, earthquake, tsunami and volcanic eruption. Australia wishes to utilize resources to cope with these issues.
 - e) The government of Australia is responsible for assisting these developing countries.
 - f) For disaster management, Australia has abundant resources in transport, health and engineering fields.
 - g) Among developing countries, there are countries whose capacity is going to be independent like Indonesia, and also there are those that do not need assistance such as China and India. On the other hand, countries in the Pacific cannot manage disasters without external assistance.
- 2) At the time of disaster occurrence, AusAID transports aid materials to sites. In Brisbane, there is a deposit for emergency materials. AusAID offers JICA the use of it. AusAID intends to collaborate with JICA in the Asia / Pacific Region by assisting each other.
- 3) FRANZ is the framework of Australia, New Zealand and France for emergency response. Each country carries out its own plan, with coordination among the framework to avoid duplication or ignorance of required activities.
- 4) Assistance of AusAID is categorized into bi-lateral cooperation and regional cooperation. In bi-lateral cooperation, AusAID makes mutual agreement with each host country. In regional cooperation, AusAID provides fund to international organizations such as SOPAC or UNDP, which implement projects, utilizing their technical resources.
- 5) Financial year of Australia is from Jan. to Dec.. The proposal for next year is presented on September.

(1) Related Organization

Bureau of Meteorology, Australia (BOM)

BOM's role in WMO is not only Regional Special Meteorological Center of the Southwest Pacific (Region V), but also have a important role in weather monitoring organizations in the world. The roles of BOM are described as follows;

- World Meteorological Center (WMC)
One of three World Meteorological Centers in the world. (other two are in Washington and Moscow).
- Regional Special Meteorological Office (RSMC)
Melbourne and Darwin are assigned as RSMCs in Region V

- Regional Instruments Center (RIC)
- Regional Telecommunication HUB (RTH) of Global Telecommunication System (GTS)

BOM is the largest RTH in Region V which is the Communication HUB of GTS.

BOM is a local representative of WMO in Region V. WMO has formulated the Strategic Plan 2012-2015 for Region V as follows;

< Global Societal Needs >

Global Societal Needs
Improved protection of life and property (related to the impacts of hazardous weather, climate, water and other environmental events and increased safety of transport on land, at sea, and in the air)
Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence)
Sustainable use of natural resources and improved environmental quality

< Strategic Thrusts and Expected Results >

Strategic Thrusts	Expected Results
Improving Service Quality and Service Delivery	Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate and water and related environmental predictions, information and services in response to users' needs and to enable their use in decision-making by all relevant societal sectors
	Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements
Advancing Scientific Research and Application as well as Development and Implementation of Technology	Enhanced capabilities of NMHSs to produce better weather, climate, and water and related environmental information, predictions and warnings to support in particular climate impact and adaptation strategies
	Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable Earth- and space-based systems for weather, climate and hydrological observations, as well as related environmental observations, based on world standards set by WMO
	Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and environment science and technology development
Building and Enhancing Partnerships and Cooperation	New and strengthened partnerships and cooperation activities to improve NNIHSs' performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategies

(2) Activities in the Countries

1) Solomon

AusAID Solomon has 20 staffs including 2 managers. Assistance programme consists of bilateral and regional programme. Annual budget for Solomon is approx. S\$ 60mil. This amount is second to PNG. Regional programme is collaborated with SOPAC.

Continuation of Public Sector Linkage Program for Risk Deduction and strengthening and unifying disaster sectors such as meteorology / earthquake-tsunami / climate change is the next target. It is expected to tackle to comprehensive capacity improvement for disaster management toward next 10 to 15 years.

The table below shows implemented projects in Solomon.

Table2-92 Implemented Regional Project by AusAID, Solomon

Project Name	Implemented Period	Target Countries	Budget Scale	Collaborated Org.
Pacific Community Focused Integrated Disaster Risk Reduction (PCIDRR)	2008-2011	Vanuatu, Fiji, Solomon, Tonga	Approx. 2.5 million AD(approx. ¥285 million)	National Council of Churches

This project is implemented together with NDMO in several villages. This project aims at strengthening community capability for DRR by identifying major risks in each community and by formulating awareness for each risk. Awareness programme in the school curriculum was also conducted.

Logistic programme for emergency relief was also implemented. This programme was collaborated with New Zealand and UK and executed by NGOs.

2) PNG

AusAID office is located in the High Commissioner of PNG with 150 staffs including 2 dedicated staffs for disaster management. Annual budget for PNG is Aus\$ 9 mil.

Coordination meeting among international donors including JICA is held chaired by NDC monthly. Supplemental meeting are also held in case serious disaster occur.

Regional Programme

Landslide mitigation project is implementing in the middle of mainland through SOPAC and World Bank. AusAID supplies budget. AusAID defined PNG as hotspot of volcanic eruption, flood, earthquake, tsunami, cyclone, river inundation, high tide, landslide and drought. Among these natural disasters, volcanic eruption is more damaging and risky for economy than flood and earthquake. Technical staff for GIS is trained in SOPAC, Fiji.

Bilateral Programme

Following 5 projects are implementing by bilateral programme for PNG.

- a. Supporting project for NDC activities (climate change, Gender)
- b. Disaster management in New Britain Province (focusing on volcanos, earthquake and tsunami in Rabaul)
- c. Humanitarian assistance (collaborated with UNOCHA)
- d. Disaster risk reduction programme (collaborated with SOPAC and World Bank)
- f. Community awareness programme (capacity development, enlightenment, preparedness / awareness of communities)

As for item f., Australian Geological Department is supporting this programme targeting eastern part of New Britain Is. to prepare hazard maps.

Other than this, AusAID conducts training programme to dispatch 2 to 3 government employees for OJT in Canberra.

3) Vanuatu

AusAID office is located in the High Commissioner of Vanuatu in Port Vila. Annual budget for Vanuatu is Aus\$ 2.5 mil (¥280mil). There are several projects on DRR.

Regional Programme

The table below shows implemented projects by AusAID in Vanuatu.

Table2-93 Implemented Regional Projects by AusAID, Vanuatu

No.	Project Name	Implemented Period	Target Countries	Budget Scale	Collaborated Org.
1	Pacific Community Focused Integrated Disaster Risk Reduction (PCIDRR)	2008-2011	Vanuatu, Fiji, Solomon, Tonga	Aus\$ 2.5mil	National Council of Churches
2	Strengthening Pacific Disaster Risk Management	2008-2011	14 Pacific Island Countries	Aus\$ 2.2 mil	SOPAC
3	Strengthening Humanitarian Emergency Response Management for Children and Women in the Pacific	2008-2011	Vanuatu, Fiji, Kiribati, Samoa, Solomon	Aus\$ 1 mil	UNICEF
4	Building Disaster Response and Preparedness of Caritas Partners in the Pacific		Vanuatu, Fiji, Kiribati, Samoa	Aus\$ 0.2 mil	Caritas Australia
5	Pacific Disaster Management Partnership	2008-2011	10 Pacific Island Countries	Aus\$ 3. mil	Australian Red Cross

FRANZ (France-Australia-New Zealand) also implements emergency response from the view point of humanitarian relief.

Bilateral Programme

The table below shows bilateral programme focusing on a community based emergency response project to assisting preparedness and awareness.

Table2-94 Implemented Bilateral Projects by AusAID, Vanuatu

Project Name	Implemented Period	Budget Scale
Improving Community Based Emergency Preparedness in Vanuatu	2008-2011	Aus\$ 0.1mil (¥ 11.4mil)

Other than this, AusAID conducts training programme by sending government employees for OJT in Canberra.

AusAID has an plan of sending Australian researchers from Commonwealth Science Research Organization for monitoring/lecturing on climate change to assess cyclone impact.

2.5.2 New Zealand Aid Programme (NZAP)

(1) Outline of the Organization and Activities

Framework of cooperation of NZAP towards the Pacific follow.

- 1) 5 countries, Tubalu, Niue, Tonga, Samoa, and Fiji are focused. AusAID also focuses on Tonga and Samoa. Therefore, the rest of the 3 are New Zealand own focal countries.
- 2) NZAP's focal points in the Pacific are the following three.
 - a) Economic development
 - b) Human development
 - c) Governance
- 3) In Disaster Risk Reduction, major activities are urgent response and rehabilitation.
- 4) During disaster occurrence, collaborated activities with Australia and France are conducted within the framework of FRANZ, which is the diplomatic agreement between the 3 countries for coordination in disaster response. Every 3 years, the chair changes. Regular meeting is held for information exchange. From New Zealand, MCDEM also participates to the activities. In recent disasters, NZAP conducted transport of relief materials.
- 5) Following are the recent activities for preparedness.

Table 2-95 Regional Programme by NZAP for Preparedness

Countries	Project Theme	Outline
Samoa, Tonga	Capacity Development for Tsunami Hazard	NDMO of each country is the implementation agencies. In 5 villages, awareness of hazards is enhanced and evacuation exercise was conducted. 2 weeks was spent for 1 workshop. Samoa has been finished. Tonga is the next project site.
Tuvalu, Niue, Tonga, Samoa, Fiji	Island Climate Update	As a adaptation countermeasures of for climate change, weather forecast for advance 1 month is conducted. Major purpose is the contribution for agricultural production .

6) The methods of assistance is categorized into two; Country Programme (Bi-lateral) and Regional Programme. Country Programme is conducted based on unique needs and conditions of the country. The country office located at each country is responsible for the Country Programme. In the Regional Programm, common issues of the Region are treated. Integrated approach is conducted. Several countries are targeted and the Headquarter in Wellington takes responsibility.

(2) Related Organizations

1) National Institute of Water and Atmospheric Research (NIWA)

NIWA is the self-sustaining organization owned by New Zealand government for the purpose of research on environmental science. Departments related with water and atmospheric research activities in various government institutes were integrated as NIWA on 1992. The research activity covers water, atmosphere, climate, coast, energy, fishery, Maori, natural disaster, ocean, and the Pacific.

The total number of researchers, technicians and support staffs are 750. The annual budget of 2011 was NZ\$ 117mil.

NIWA conducts training and capacity building on practical aspect of science. Recent activities in the Pacific are tabulated below. NIWA collaborates with not only NZAP, but also donors and international organizations such as ADB, UNDP, WB, SOPAC, SPREP, and NOAA.

Table 2-96 Recent Activities by NIWA on DRR in the Pacific

Targeted Countries	Outline/Related Local Agencies
Cook Islands	National Environmental Service, Meteorological Service
Samoa	Ministry of Environment and Natural Resources
Fiji	Meteorological Service
Regional	1) Equipment supply and hydrological training support to the Pacific HYCOS project 2) Coordination of the Island Climate Update, a regional climate bulleting providing accurate and timely outlooks and projections in association with SPREP and SOPAC

2) Ministry of Civil Defence and Emergency Management (MCDEM)

MCDEM is the government organization for disaster management. MCDEM conducts risk reduction and immediate response during disaster occurrence based on vulnerability of communities, infrastructures and hazards of disasters. MCDEM collaborates with local governments and other disaster related organizations, towards making communities that are resistant to disasters by inputting appropriate measures, knowledge, and techniques in New Zealand. MCDEM also conducts the following activities overseas.

a) Urgent response

MCDEM dispatches disaster relief team to the Pacific under FRANZ framework.

b) Technical cooperation/equipment procurement

MCDEM is the implementation Agency for Pacific Tsunami Risk Management Project.

This project started after tsunami disaster on 2009, and aims for capacity development on disaster management of the countries in the Pacific. The project is summarized as follow. It is implemented with close collaboration with local disaster management organizations, such as NDMO.

Table 2-97 Outline of Pacific Tsunami Risk Management Project

Purpose	To contribute to reduce loss of life and injury and economic impact
Targeted countries	Samoa, Tonga, Cook Islands, Niue, Tokelau
Budget	NZ\$ 2.7mil (¥202mil)
Project Component	1) Assessment of tsunami hazard risk 2) Provision of warnings through detection, threat evaluation and dissemination of alerts. Procurement of sirens is done. 3) Public education to ensure preparedness

c) Activities at international organizations and regional workshop

An official of MCDEM work as a chair of Working Group (Tsunami awareness and response) at PTWS (Pacific Tsunami Warning System) . This is an important position for International Coordinating Group for Tsunami Warning System in the Pacific (ICG/ITSU)

In the tsunami workshop held in Samoa, Tonga, and Cook Islands on 2011 (Pacific Wave 2011), MCDEM staffs conducted major roles as lectures and coordinators.

(3) Activities in the Countries

1) Fiji

The office is located in New Zealand High Commission. Its jurisdiction covers Fiji and Tuvalu. Ministry of Foreign Affairs of New Zealand divides the Pacific into twelve areas.

Due to the sanction for Military regime, aid has been suspended except for humanitarian aid. For emergency response, 1 officer is assigned for information gathering and coordination of humanitarian aid. 3 regional managers will do the on-site responses under supervise of Wellington. Annual budget for 2011 was NZ\$ 4.7 mil (¥ 352mil), It is NZ\$ 4.0mil (¥ 300mil) for 21012. Main menu is as follow.

- a) Disaster Risk Reduction (DRR)
- b) Home and Squatter Settlement
- c) Immediate Response / Rehabilitation

For a) provision of equipment for National Disaster Management Center (NDMC) or giving training have been conducted. Other plans are yet to have progress;

- Upgrade of NDMO's operation center's equipment
- Provision of materials for evacuation center such as cooking equipment and blankets

b) is for humanitarian aid. This project is relocating squatter's settlement from flooded area to safer places. Sanitation improvement for sewage, provision of educational equipment and healthcare improvement have been also implemented. NGO and Rotary Club are collaborating organizations.

c) is mainly applied for cyclone. Recently (2009 cyclone Mick, 2010 cyclone Tomas), emergency response and emergency rehabilitation have been implemented. Repair works for damaged facilities of evacuation shelters (schools, community centers and churches) has been implemented. For instance, slope for wheel chairs, installation of partitions, installation of rain water tanks and waterproof treatment for toilet was implemented. In case of disasters, response shall be done under direction of head-quarter in Wellington. Additional human resources are mobilized in case of needs. It also provides logistic support for MCDEM.

2) Vanuatu

NZAP Office of Vanuatu located in New Zealand High Commission is providing support for Vanuatu with six staff members. Two of them are in charge of disaster prevention. There are two types of assistance program, regional cooperation and bilateral cooperation.

Regional Cooperation

In emergency, France, under the framework of FRANZ, mainly works for logistics by the military based in New Caledonia, Australia works for food assistance, and New Zealand works on the logistics for transporting relief materials. On-going-projects are summarized in the following table.

Table 2-98 On-Going Projects by NZAP, Vanuatu

No.	Project Name	Implementation Period	Outline
1	Improvement of data communication system for Volcano Monitoring Network	Implementation Period: 2011-2013	<ul style="list-style-type: none"> • Target Number of Volcano Monitoring Station: 6 existing stations • Data Communication Method: Microwave and WiFi
2	Rehabilitation of water supply facility in Tafea Province damaged by 2 cyclones	2011	

Bilateral Program

The following three fields have been prioritized. DRR is not included. The budget for the program in 2012 is NZ\$ 20 mil.

- 1) Economic development (21% of Total Budget)
 - a. Department of Forestry for tree nurseries and forestry training
 - b. Vanuatu Rural Development Training Centers Association for vocational training of rural youth
 - c. Improvements to inter-island shipping services through better wharves, and safety and market regulations (pending)
 - d. Ministry of Lands for improved security of tenure and more rapid resolution of land disputes.
- 2) Education (48% of Total Budget)
 - a. Providing school grants for children in years one to six to replace fees paid by parents and encouraging more children to attend school
 - b. Building classrooms and water tanks
 - c. Providing reading books and stationery to primary schools
 - d. Supporting development of a national curriculum and curriculum standards.
- 3) Enhancing Law and Justice and Good Governance (28% of Total Budget)
 - a. Wan Smol Bag, a local non-governmental organization that works with chiefs, rural communities, youth, women's organizations, teachers and the police to raise awareness of the workings of government and people's rights.
 - b. Vanuatu Women's Centre, which plays an effective role in addressing domestic violence against women and families in Vanuatu.
 - c. Vanuatu Association of Non-Government Organizations' (VANGO) , the national focal point for civil society organizations in Vanuatu.
 - d. Department of Local Authorities, the focal point for decentralization.

3) Tonga

NZAP Office of Tonga is located in New Zealand High Commission. It is currently carrying out bilateral cooperation with five staff members. The assistance currently conducted was agreed in the Joint Commitment between both countries in July, 2011. The assistance includes energy, private sector

development, tourism, public peace, and education. However DRR is not included. Among them, the priority is given to education, tourism and energy. The total budget for all the fields in 2012 is NZ\$ 17 mil.

Aside the above-mentioned budget, emergency assistance under the framework FRANZ is carried out in the event of disasters. MOCDEM is also dispatched when Tonga suffered a major damage from the cyclone "Jasmine".

2.5.3 European Union (EU)

EU representation (EU Delegation) is located in Suva. The delegation in Fiji controls over the Pacific. The Programmes that have been carried out under the control of the delegation are described in the following table;

Table2-99 On-Going Programmes by EU in the Pacific

No.	Programme Name	Outline	Target Countries
1	Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (Implemented by SPC, 2011-2014)	Promote a long term/strategic approach to adaptation to Climate Change planning and budgets and to pave the way towards more effective and coordinated aid delivery modalities at national and regional level in the sector of Climate Change.	9 Countries: Cook Islands, Kiribati, Marshall Micronesia, Nauru, Niue, Palau, Tonga and Tuvalu.
2	Disaster Risk Reduction in 8 Pacific ACP States (Implemented by SOPAC, 2008-2013)	This multi-country project strengthens national capacity to reduce vulnerability to natural disasters and build resilience. The components: 1) Strengthening the seismic monitoring network; 2) Establishment of weather stations for monitoring in remote areas and linked effectively to the national early warning systems; 3) Development of national flood management and enhance capacity of Environment and Conservation in flood monitoring; 4) Strengthening of communication network on national early warning system between National Disaster Centre with key stakeholders; 5) Increase of public awareness at national, provincial and community levels. 6) Project Cost: EUR3.2 million	8 Countries : Micronesia, Marshall Nauru, Palau, PNG, Solomon, Tuvalu
3	Technical Cooperation Facility (2011-2014)	The components: 1) Development of projects for funding under the 10th EDF Regional Indicative Programme, and improvement of capacity building of regional organizations and other stakeholders to deliver and report on better and sustainable outcomes; 2) Enhancement of political dialogue between Pacific ACP States, CROPs, the RAO, the EU and other development partners on future development strategy and new implementation approaches in view of the possible 11th EDF programming and in the context of the EU-Pacific Joint Climate Change initiative 3) Improvement of macroeconomic and public financial management capacity in Pacific ACP States to improve their ability to withstand economic shocks (e.g the resent the financial crisis and economic downturn) and to improve their readiness for Budget Support : 4) Project Cost: EUR 2 million	15 Countries: Cook Islands Timor-Leste Fiji, Kiribati, Marshall, Micronesia, Nauru, Niue, Palau, PNG, Samoa, Solomon, Tonga, Tuvalu, Vanuatu

1) Solomon

The EU-Delegation, of Salomon is currently providing support with ten staffs. Among those, five are international staffs and the rest of five are local staffs.

The EU representation in Salomon is under the control of the EU representation in PNG. EU, which doesn't formulate its own projects, is providing financial support through the Solomon Ministry of Finance. The support is proceeded according to the national programs such as "National Adaptation Programme of Action (NAPA)" and "National Disaster Risk Management Plan for Disaster Management and Disaster Risk Reduction Including for Climate Change(NDRMP)". The budget scale is EUR 2.8 mil (¥ 299mil) in two years (2012 to 2013).

The on-going programs are described in the following table and No. 2 and 3 in the upper table.

Table 2-100 On-Going DRR Programme by EU, Solomon

Name of Programme	Description
Solomon Islands Climate Change Adaptation Programme (SICAP, 2011-2013)	Contribute to climate change adaptation and reduction of vulnerability of people and communities in Solomon Islands.

In addition to these, EU supports the disaster preparedness at the community level which is conducted by the France Red Cross (budget: EUR 0.3mil), although it is a small scale. For implementation of the programs and projects, "Climate Change Working Group" has been organized by the Salomon officials, donors, NGOs, etc., and the meetings are held four times a year.

2) PNG

The EU in PNG is carrying out the support by the organization composed of the ambassador, head of operators (2), project managers (7), and other support staffs.

The EU in PNG is in the position to manage the EU in Salomon and Vanuatu in respect with financial and contract supervision. Support of EU is taking the measures against a climate change as the focal point. The emphasis is put on health and DRR. The No.2 and No.3 in the upper table are being implemented. However, the progress has been delayed due to insufficient capability in the financial and manpower aspect of the PNG government. .

Then, EU cooperate with SOPAC to support seminars and workshops in order to establish the system which can monitor the progress and secure the visibility of CCA projects.

2.5.4 World Bank (WB)

Pacific Regional Office in Sydney controls country offices in the Pacific. The outline of the World Bank activities in the countries is as follow.

1) Fiji

WB has the following views about DRR in the Pacific.

- 1) WB has given the high priority to DRR as the adaptation measures for climate change.
- 2) Judging from the past disaster, the ownership on DRR of each country is lacking. Their activities incline toward urgent response, and there is no long range perspective about preparedness.
- 3) Although much equipment is needed for DRR such as warning system, the budget for its operation and maintenance is not enough. The staff also runs short.
- 4) Prior to the implementation of the project, it is important to confirm whether policy, knowledge and capacity are at the sufficient level.

Following projects are implemented by WB in Fiji.

Table 2-101 Outline of Disaster Management Program by WB, Fiji

Program Name	Project Name	Outline	Cost
Disaster Risk Reduction	Integrated Flood Management in the Pacific-Nadi Flood Pilot (Stage I)	1) Institutional strengthening of flood forecasting and warning system (US\$ 0.4 mil) 2) Flood risk assessment, identification of mitigation and dissemination (US\$ 0.6mil) 3) Institutional strengthening for integrated flood management (US\$ 0.25 mil)	US\$1.25mil (¥ 100 mil)

The WB is building an insurance market. The purpose of the insurance is rehabilitation after disaster occurrence. The amount of damage was calculated using the model and the insurable value was also estimated. Actual examples will be further reflected in a model. It is necessary to set up standardization. It is a stage of development trial and has not reached in the stage of practical use.

2) Solomon

WB has dispatched a policy advisor to NDMO. The advisor will give advice on DRR, CCA (Climate Change Adaptation) and food security. WB has assessed NDMO has capability of emergency response. WB is setting further focus toward preparedness and awareness. Assistances for DRR consists of three (3) components.

First component is for setting up policy and frameworks. The frameworks are composed of CCOF (Climate Change Operation Framework) and DRMOF (Disaster Reduction Management Operation Framework). Policy advisor will make recommendation on DDR & CCA for planning and policy level management. Policy advisor will also make request for correction of planning and policy level management according to the recommendation. WB's programme implementation methodology is shown in the figure below..

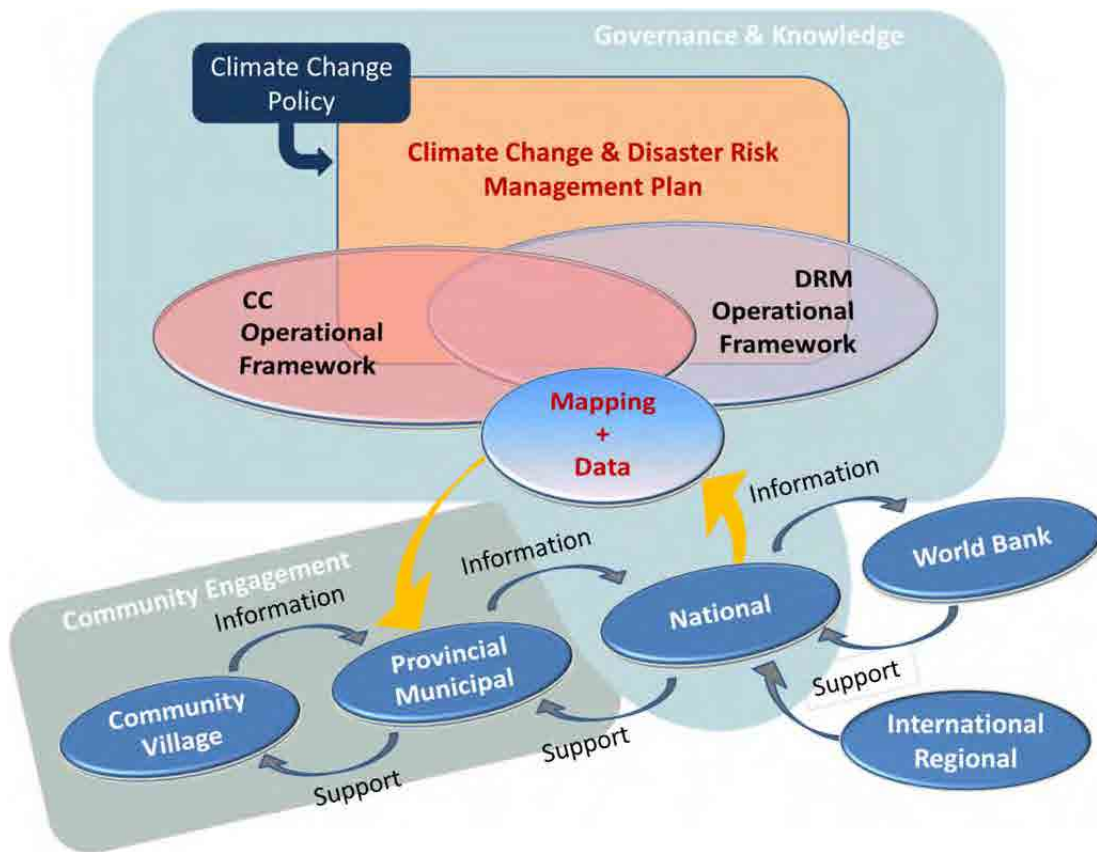


Figure 2-29 General Idea of WB Program Implementation Methodology, Solomon

Second component is to collect scientific knowledge by using GIS and database software and to make it accessible from relevant institutes. This component is called “Best Storage Science”. Third component is community based lay out to implement DRR & CCA programs. It is called “Community Driven Program”, but the project image has not been built. Its concept is RDP (Rural Development Program) alike. The program may be implemented when communities find needs and ensure sustainability. There are two (2) candidate sites. They are planed in Guadalcanal is. Santa Cruz Is. The programme is summarized below.

Table 2-102 DRR Program implemented by WB, Solomon

Program Name	Project Name	Details	Amount (USD)
Japan Policy and Human Resources Development Technical Assistant Program to Support Disaster Reduction and Recovery	Increasing Resilience to Climate Change and Natural Hazard in Solomon Islands	1) Coordination among CCA and DRR related institutions (US\$50,000) 2) Information and communication (US\$1,129,800) 3) Pilot investments (US\$1,220,000) 4) Monitoring & evaluation (US\$51,500) 5) Project management (US\$278,700)	US\$ 3.0 mil (¥ 240 mil)

At WB Solomon office, there are the country manager and operations manager. It is composed of four (4) divisions; Justice for Poor, Communications, Extractor Industries and DRM (Disaster Risk

Management). DRM Division dispatches experts to governmental agencies. Five (5) years budget for DRM Division is US\$ 8.6mil.

3) Vanuatu

Currently, following Programme has been implemented in Vanuatu.

Table 2-103 DRR Program iby WB, Vanuatu

Programme Name	Project Name	Outline	Project Cost
Japan Policy and Human Resources Development Technical Assistant Program to Support Disaster Reduction and Recovery	Mainstreaming Disaster Risk Reduction in Vanuatu	1) Risk mapping to support urban preparedness and planning (US\$ 0.7mil) 2) Tsunami warning system for urban area (US\$ 14mil) 3) Integration of DRR and CCA activities (US\$ 0.2mil) 4) Monitoring & evaluation (US\$ 0.05mil) 5) Project management (US\$ 0.24mil)	US\$ 2.9mil (¥240mil)

By using Global Environment Facilities, Dept. of Water Resources implements the following project for flood control at Luganville, Santo Spirito Is..

Table 2-104 Integrated Water Resources Management by WB, Vanuatu

Project Name	from	till	Fund Name	Collaborated Organization
Integrated Water Management Guide Line for Latakata River, Luganville	2009	2013	Global Environment Fund	SOPAC

4) Tonga

In Tonga, WB opened ADB and World Bank Group Joint Development Coordination Office on May 2009. One (1) officer and one (1) secretary are stationed in this office. WB's Pacific Region Office in Sydney supervises this office. WB has dispatched experts for infrastructure development and macro-economic policy. They have a capacity building programs in these fields.

Currently, ADB implements only one DRR project. This is Tonga Post Tsunami Reconstruction Project (US\$ 5mil (¥ 400mil)).

5) Samoa

By using Global Environment Facilities, Water Resources Div. implements the following project for water resources management over the upper basin of Apia.

Table 2-105 Integrated Water Resources Management by WB, Samoa

Project Title	Integrated Water Resources Management Project
Project Cost/Source of Fund	US\$ 0.5mil (¥ 40mil) Global Environment Facilities
Project Period	2011 - 2014

Outline	<p>Pilot Project for Basin Management. The Project is implemented at Apia; For the land located at the altitude higher than 300m, land use regulation as follow shall be applied</p> <ol style="list-style-type: none"> 1) to preserve the retarding capacity of the basin, agroforestry is introduced 2) to protect the water quality, use of bio mass manure is encouraged
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By using Global Environment Facilities, Land Management Div. implements the following project for coastal erosion control as CCA.

Table 2-106 Coastal Erosion Control by WB, Samoa

Project Title	Coastal Zone Management, Pacific Adaptation to Climate Change
Project Cost/Source of Fund	US\$ 0.75mil (¥ 60mil) Global Environment Facilities
Project Period	2009 - 2013
Outline	Pilot project for coastal zone management. The Project is implemented around Apia and other local cities. Project activities includes awareness of people on coastal erosion , sand mining control, sea wall construction, and, forestation.

2.5.5 Asian Development Bank (ADB)

South Pacific Sub-regional Office in Fiji controls the ADB country offices in the Pacific. The countermeasures for DRR is closely related with climate change, and required fund is offered from Climate Change Fund. On-going projects in the Pacific are shown in the following table.

Table2-107 Programs for Climate Change and Disaster Management by ADB, in the Pacific

Country	Program	Project	Outline	Cost
Pacific Developing Member Countries (PDMCs)	Pacific Climate Change Program	Pacific Climate Change Response	<ol style="list-style-type: none"> 1) Technical assistance: Climate Resilient Development, Coral Triangle Initiative, Clean Energy; US\$ 42mil 2) Project grants and concessional; climate adaptation: US\$ 166mil, mitigation; US\$ 42mil 	US\$ 250 mil (¥ 20bil)
Pacific Island Countries (PICs)	Pacific Disaster Risk Finance and Insurance Program (PDRFI)	Pacific Catastrophe Risk Assessment and Financing Initiative	<ol style="list-style-type: none"> 1) Integrated Disaster Risk Financing and insurance strategy 2) Development of Private Catastrophe Risk Insurance Market 	-

Note) PDMCs: Cook Islands, Fiji, Kiribati, Marshal Islands, Federated States of Micronesia, Nauru, Palau, PNG, Solomon Islands, Timor Leste, Tonga, Tuvalu, Vanuatu

PICs: Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Marshal Islands, Nauru, Niue, Palau, PNG, Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu, Vanuatu

2.5.6 United Nations Development Program (UNDP)

The regional headquarter in Asia and Oceania of UNDP is located in Bangkok, and the Pacific Regional Office which controls 15 countries in the Pacific is located in Fiji.

1) Fiji

UNDP Pacific Regional Office, consisting of about 20 staffs, carries out the development assistance and cooperation programs for 15 countries. As main activities, Disaster Reduction & Recovery Programs (DRRP) related with climate change is carried out in collaboration with SOPAC. Since only the staffs for administration are assigned to UNDP, technical support and activity cooperation are done in cooperation with SOPAC.

Table 2-108 Outline and On-going Activities of UNDP, Fiji

Item	Outline
1. Offices	Asia and Oceania Regional Office: Bangkok Pacific Regional Office: Fiji
2. Activities	Development Assistance for 15 Countries in the Pacific
3. Staff	20 Staffs
4. Programs	1) Disaster Reduction & Recovery Program for Climate Change Adaptation 2) Implementing Programs <ul style="list-style-type: none"> a. Education Program (Best Practice & Knowledge) b. Agricultural Sector Program (Community Risk Reduction Program) c. Maintenance for Weather Observation Instrument such as Tide Gauges d. Climate Change Adaptation in Tuvalu and Kiribati (Regional Program) e. Gender Issue 3) South-South Cooperation (Pacific and Caribbean Islands) Climate Change Adaptation & Disaster Risk Management

As cooperation beyond regions, there is a program for climate change adaptation and disaster risk management between the Pacific and the Caribbean as South-South Cooperation. This program aims at finding out the solution over various threats accompanying climate change by exchanging information, including the experiences and best practices in both region that have the common base of vulnerable characteristics as archipelagic countries.

This program that started on March, 2010 is still under an interim phase. Main activities implemented so far are exchange of information on climate change adaptation among Fiji, Jamaica & Trinidad Tabaco, exchange of information on technology adopted for disaster risk management and introduction of best practice in Cook Islands.

The weather observation equipment such as tide gauges has been introduced with cooperation of donors. However, there is no compatibility among observation equipment and it is raised that observation with sufficient accuracy has not been performed.

2) Solomon

The UNDP Salomon Office is a joint office with the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA). The cooperation programs for Salomon are carried out by 22 staffs. Activities of UNDP in Salomon started on 2006 as an official resident office. The office opened as a project office on 2003.

16 UN related organizations in the Pacific set DRR and environment issue as focal points for CCA during 2013-2017 in the 14 countries in this region. On-going programmes related to DRR are described in the following table. The support is extended for capacity building on community level at devastated and vulnerable areas against global warming. In the Programme No. 1 described in the following table, four AWS Automatic Weather System and twelve rain-gauges will be installed for agricultural purpose.

Table2-109 Implemented Programmes by UNDP in the Pacific Region

No	Name of Programme	Description
1	Enhancing resilience of communities in Solomon Islands to the adverse effects of climate change in agriculture and food security (2008-2012)	1) Community based adaptation initiatives implemented in at least 18 Communities across at least 3 regions in the Solomon Island 2) Institutional strengthening to support climate resilient policy frameworks for the agriculture sector 3) Climate change adaptation specific knowledge production, sharing and dissemination
2	UNDP Response to the Flash Flood in the Solomon Island (Western Guadalcanal, 2009-2010)	1) Assessment of disaster 2) Assessment reports and effective mechanism for the coordination of an early recovery 3) Re-establishment of livelihood for affected communities 4) Enhancing the resiliency and adaptation capacities of settlements against future disasters
3	Recovery Assistance for Earthquake and Tsunami in the Solomon Islands (2010-2011)	1) Rebuilding the livelihoods of affected communities 2) Assisting NDMO on risk assessment given ongoing risk and the possibility of flashfloods 3) Establishing a bottom-up early warning system for geological hazards

In addition to the above, UNDP is going to provide Standard Operation Procedure (SOP) for clusters which were instituted in National Disaster Risk Management Plan (2010). UNDP understands that JICA has advantage at technical assistance while UNDP has advantage at capacity strengthening in administration.

The following points were mentioned as problems on DRR in Salomon.

- 1) Salomon is a country which consists of 900 islands. It is difficult to extend and deliver support to remote islands during disasters.
- 2) In some areas, communication system is not well established. It is difficult to obtain information of the situation of a devastated areas during disaster events.

2.5.7 United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)

1) Fiji

It has the regional office at Suva in Fiji. 6 officers are stationed. Out of the 6 officers are personnel who will be assigned for emergency response teams. Annual budget is US\$ 1.1 mil. UNOCHA its has head-quarters in New York and Geneva. It has more than one thousand eight hundred (1,800+)

officers in total. Suva office covers Asia and Pacific. At Port Moresby in PNG, UNOCHA has a sub-regional office. Location of the offices is on figure below.

At the request of counties, UNOCHA dispatches emergency response teams to disaster affected areas. The emergency response teams will act as liaison and coordinating body for aforementioned governmental institutes, donor countries, and NGOs. In many cases, emergency response teams are dispatched to the country which has less capability of information sharing. In Fiji, emergency response team was set up when cyclone Thomas (2010) attacked. Recently, capability of the countries are being improved. Therefore the focus is on enforcing preparedness such as forming contingency plan, forming SOP and ITC support.

Table 2-110 UNOCHA Emergency Response Teams Dispatched to the Asian-Pacific

Year	Incident	Country	Remark
2011	Tropical Cyclone	Vanuatu	Vania and Atu
2011	Draught	Kiribati	
2010	Tropical Cyclone	Cook Island	Cyclone Pat
2010	Tropical Cyclone	Fiji	Cyclone Tomas
2010	Volcanic Eruption	Vanuatu	Gaua
2009	Volcanic Eruption	Vanuatu	Ambrym and Gaua
2009	Flood	Fiji	Viti Levu, Vanua levu
2009	Flood	Solomon Islands	Gudalcanal
2009	Tsunami	Samoa and Tonga	
2009	Tropical Cyclone	Fiji	Cyclone Mick
2009	Tsunami	Solomon Islands	

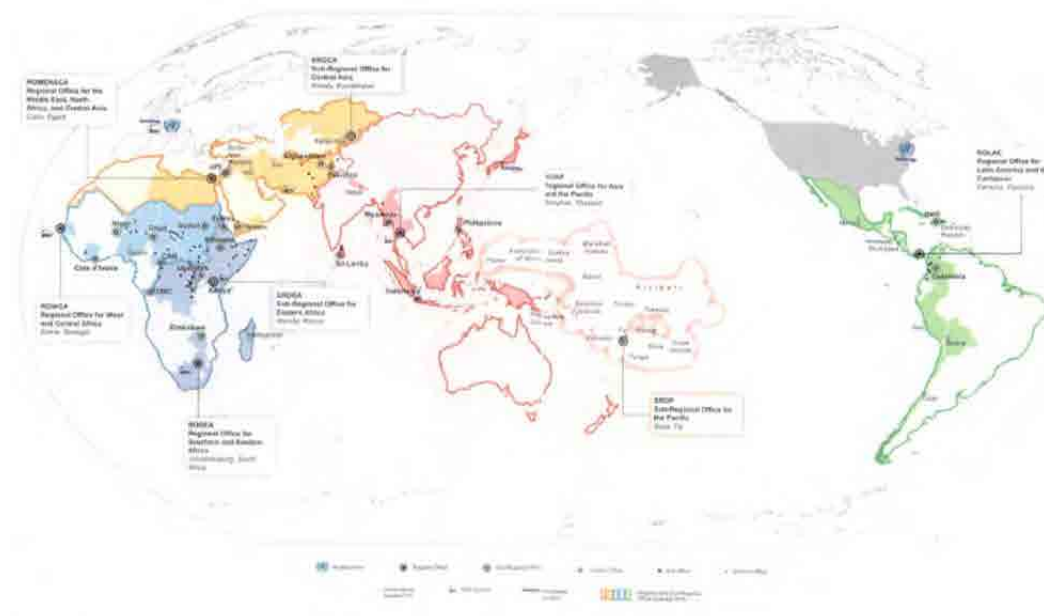


Figure 2-30 Location of UNOCHA Offices

2.5.8 The United Nations Children's Fund (UNICEF)

Regional representative office is located in Fiji. The office controls the activities in the Pacific.

1) Vanuatu

The UNICEF Vanuatu office is a joint office with the United Nations Development Programme (UNDP), the United Nations Population Fund (UNFPA), and the International Labor Organization (ILO). The office was established in 2008 and the 11 staffs are carrying out activities. The support for Vanuatu is carried out in accordance with United Nations Development Assistance Framework for the Pacific Sub-region, 2008-2012.

As a project relevant to DRR, "Building Resilient Communities Towards Effective Governance" was implemented in 2007-2010. In the project, support for "the community resilience" was offered in two local administration organizations. Moreover, as its succeeding project, the activities are expanded to 12 places, and the adaptation against the climate change and natural disasters are ongoing now in a community level.

Table2-111 Community Resilience Programme by UNICEF

Title of the Project	Community resilience and coping with climate-change and natural disasters in Vanuatu, 2011– 2013
UN responsible Organization (s)	UNICEF Pacific, UNDP Fiji Office, UNFAO Pacific
Total Budget	US\$ 2.9mil
<p>Main Activities:</p> <ol style="list-style-type: none"> 1) Communities in the 12 Area Councils will identify human security threats, hazards, vulnerabilities and capacities and develop comprehensive preparedness, response, mitigation and adaptation plans and interventions, focusing on governance, food, and nutrition and water security; 2) In order to translate the concept of human security into action, leaders, managers and members of faith-based and other organizations/groups will be empowered with knowledge and skills to mainstream building community resilience and coping capacity into human development, governance and decision-making; 3) To achieve food security, households will be empowered to practice appropriate food production, processing, storage and preparation methods to minimize crop, food and nutrient losses and equipped with knowledge and skills to process and market surplus food. 4) If and when disaster strikes, national government will preposition emergency nutrition supplies for vulnerable groups, especially women, children, elderly and people living with disabilities and HIV/AIDS 5) For water security, existing and potential water sources will be assessed to determine suitability to the identified threats and hazards and communities will develop and implement water security and safety plans. Throughout the implementation period of the project, achievements, experiences and lessons learned will be documented, shared and communicated. 	

NAPA of Vanuatu was set up in 2007. It is under review in implementation schedule. It will be revised on in June, 2012.

2.5.9 Cooperation Programme by Donors in the Pacific

The study team visited the offices of donors and international agencies to gather information on cooperation programs in the Pacific. Based on the information and previous reports prepared by JICA as well as Japanese Government Assistance Record on the web-site of the Ministry of Foreign Affairs, donors' activities in the Pacific are tabulated below.

Table 2-112 Activities by Donors in Fiji

(DRR: Disaster Risk Reduction in General, W: Water, F: Flood, C: Cyclone, EQ: Earthquake, T: Tsunami, V: Volcanic Activity)

Country	Donors	Programs	DRR	W	F	C	EQ	T	V
Fiji	Japan	Capacity development for meteorological warning and communication network (Regional)		○					
		Regional meteorology training for Pacific (Regional)		○					
		Operation of the earthquake observation network (Regional)					○		
		Strengthening community-based disaster risk management (Regional)			○				
		Volunteers for meteorology and disaster risk management	○	○					
		Training course for disaster risk management			○				
	Australia	Activities on awareness of preparedness (FSPI)	○						
		Formulation on National Disaster Plan, Arrangement for communication system in emergency, Review of national disaster management law	○						
		Financial assistance in emergency	○						
		Pacific community focused integrated risk reduction (Regional)	○						
		Strengthen humanitarian emergency response for children and women in the Pacific (Fiji, Vanuatu, Kiribati, Samoa, Solomon)	○						
		Building disaster response and preparedness of the Caritas partners in the Pacific	○						
	New Zealand	Assistance for natural disaster prevention management	○						
		Disaster risk reduction (DRR)	○						
		Home and squatter settlement	○						
		Immediate response and rehabilitation program for disaster by cyclone Thomas				○			
	France	Early flood warning system in Nadi River			○				
		Early flood warning system in Ba River			○				
	EU	Early flood warning system in Navua River (SOPAC)			○				
		Early flood warning system in Rewa River			○				
		Hydrological cycle observation system in Nadi River (HYCOS)			○				
	World Bank	Integrated flood management in the Pacific-Nadi Flood Pilot (JPHRD)			○				
	UNDP	Community risk reduction program in Navua River			○				
Red Cross	Enhancement for disaster prevention awareness	○							
USP	Training for land resources management and coastal management	○							

Sources) Project implementation plan (Ministry of Foreign Affairs, Japan), JICA's previous reports (Pacific Region) & the Survey Team

Table 2-113 Activities by Donors in Solomon and PNG

(DRR: Disaster Risk Reduction in General, W: Water, F: Flood, C: Cyclone, EQ: Earthquake, T: Tsunami, V: Volcanic Activity)

Countries	Donors	Programs	DRR	W	F	C	EQ	T	V
Solomon Islands	Japan	Improvement of radio broadcasting network for disaster prevention	○						
		Strengthening community-based disaster risk management (Regional)			○				
		Volunteers for disaster risk management	○						
		Training course for disaster risk management			○				
		Meteorology training for Pacific (Regional)		○					
		Climate change adaptation and disaster risk management (S-S cooperation)	○	○					
	Australia	Strengthen NDMO	○						
		Community based disaster prevention project (SIDP)	○						
		Strengthen community capability for climate change adaptation	○						
		Strengthen disaster management capability (by SOPAC)	○						
		Disaster management for flash flood (UNDP)			○				
		Stock for disaster relief aid	○						
		Community risk management (World Vision)	○						
		Pacific community focused integrated risk reduction (Regional)	○						
	New Zealand	Strengthen humanitarian emergency response for children and women in the pacific (Fiji, Vanuatu, Kiribati, Samoa, Solomon)	○						
		Community based disaster risk management			○				
	EU	Disaster education plan for primary school and junior high school	○						
	EU	Climate change adaptation program		○					
	World Bank	Increasing resilience to climate and natural hazard (JPHRD)		○					
	ADB	Preparation for Tsunami hazard map					○		
Preparation bathymetric chart						○			
UNDP	Community risk management in communities			○					
	Response to the flash flood			○					
	Recovery assistance for earthquake and tsunami					○	○		
UNICEF	Strengthen disaster rehabilitation plan and coordination capability	○							
Red Cross	Urgent assistance program	○							
PNG	Australia	Assistance program to support NDC	○	○					
		Disaster prevention activities in New Britain Province (Disaster prevention in Rabaul)					○	○	○
		Assistance for UNOCHA	○						
		Assistance for disaster risk reduction activities (SOPAC, WB)	○						
		Disaster dissemination activities for community	○						

Sources) Project implementation plan (MOFA Japan), JICA's previous reports (Pacific Region) & the Survey Team

Table 2-114 Activities by Donors in Vanuatu, Tonga and Samoa

(DRR: Disaster Risk Reduction in General, W: Water, F: Flood, C: Cyclone, EQ: Earthquake, T: Tsunami, V: Volcanic Activity)

Countries	Donors	Programs	DRR	W	F	C	EQ	T	V
Vanuatu	Japan	Capacity development for meteorological warning and communication network (Regional)		○					
		Regional meteorology training for Pacific (Regional)		○					
	Australia	Assistance for formulation of action plan on National Disaster Prevention Plan	○						
		Advisory on climate change adaptation		○					
		Equipment provision for Short-wave radio	○						
		Strengthen Red Cross	○						
		Survey on impacts by cyclone				○			
		Pacific community focused integrated risk reduction (Regional)	○						
		Strengthen humanitarian emergency response for children and women in the pacific (Fiji, Vanuatu, Kiribati, Samoa, Solomon)	○						
		Building disaster response and preparedness of the caritas partners in the pacific (Vanuatu, Fiji, Kiribati, Samoa)	○						
		Improving community based emergency preparedness	○						
	New Zealand	Improvement of data communication for volcano monitoring system							○
	France	Metrological equipment provision for meteorological service		○					
		Study on earthquake cycle						○	
	USA	Preparation for action plan on disaster prevention plan in Penama Province	○						
		Information communication in disaster, report on disaster condition, Foundation for Community disaster council	○						
	China	Equipment provision for monitoring on earthquake, Training for staffs						○	
	World Bank	Mainstreaming disaster risk reduction (JPHRD)	○						
	UNDP	Capacity development for local government in Penema Provence and Shefa Province	○						
	UNICEF	Disaster prevention measured in local government	○						
	Community resilience and coping with climate change and natural disasters	○							
Red Cross	Training for urgent disaster response to volunteers	○							
	Training in community for fast aid	○							
Tonga	Japan	Operation of the earthquake observation network(Regional)						○	
		Capacity development for meteorological warning and communication network (Regional)		○					

Countries	Donors	Programs	DRR	W	F	C	EQ	T	V
		Regional meteorology training for Pacific (Regional)		○					
		Volunteers for disaster risk management and climate		○					
		Training course for disaster risk management and meteorology		○					
	Australia	Pacific community focused integrated risk reduction (Regional)	○						
	World Bank	Capacity development on urgent risk management on disaster rehabilitation project by cyclone					○		
		Post Tsunami reconstruction					○		
Red Cross	Training for Climate change		○						
Samoa	Japan	Capacity development for meteorological warning and communication network (Regional)		○					
		Regional meteorology training for Pacific (Regional)		○					
		Climate change adaptation program		○					
		Improving the weather forecasting system and meteorological warning facilities		○					
		Volunteers for weather forecasting system		○					
	Australia	Strengthen humanitarian emergency response for children and women in the pacific (Fiji, Vanuatu, Kiribati, Samoa, Solomon)	○						
		Building disaster response and preparedness of the caritas partners in the pacific (Regional)	○						
	World Bank	Risk management on infrastructure assets management	○						
Risk management for urgent rehabilitation project by disaster of cyclone						○			

Sources) Project implementation plan (MOFA Japan), JICA's previous reports (Pacific Region) & the Survey Team

Table 2-115 Inter-regional Activities by Donors in the Pacific

(DRR: Disaster Risk Reduction in General, W: Water, F: Flood, C: Cyclone, EQ: Earthquake, T: Tsunami, V: Volcanic Activity)

Countries	Donors	Programs	DRR	C	F	C	EQ	T	V
Inter-Regional Cooperation In the Pacific	Japan	Capacity development for meteorological warning and communication network (Regional)		○					
		Regional meteorology training for Pacific (Regional)		○					
		Operation of the earthquake observation network(Fiji, Tonga)						○	
		Strengthening community-based disaster risk management (Fiji, Solomon)			○				
	Australia	Building disaster response and preparedness of the caritas partners in the pacific (Vanuatu, Fiji, Kiribati, Samoa)	○						
		Improvement of early Tsunami warning system					○		
		Strengthening pacific disaster risk management (by SOPAC, in 14 Countries)	○						
		Assistance for actin plan for National Disaster Management (SOPAC)	○						
		Strengthen humanitarian emergency response for children and women in the pacific (Fiji, Vanuatu, Kiribati, Samoa, Solomon)	○						
		Pacific community focused integrated risk reduction (Solomon, Fiji, Vanuatu, Tonga)	○						
		Pacific disaster management partnership (in 10 Countries)	○						
	New Zealand	Management for Natural resources and disaster prevention	○						
		Improvement for volcanic activity monitoring system (FRANZ, Vanuatu)							○
	EU	Assistance for formulation of national disaster management, sand excavation management in the coastal area, water resource management, evaluation for damage potential by natural disasters	○						
		Equipment provision for disaster reduction for each country (SOPAC)	○						
		Data base formulation program for sea level monitoring (SPSLCMP)		○					
		Increasing climate resilience of the Pacific small islands states through the global climate change alliance (CI, Kiribati, M. Islands, FSM, Nauru, Niue, Tonga, Tuvalu)		○					
		Disaster risk reduction in 8 Pacific ACP States (FSM, M. Islands, Nauru, Palau, PNG, Tuvalu, SI, Tonga)	○	○					
	GEF	Climate Change Adaptation in the Pacific (PACC)		○					
	ADB	Mainstreaming environmental issues on economy and development plan		○					

Countries	Donors	Programs	DRR	C	F	C	EQ	T	V
		Pacific climate change program (PDMCs)		○					
		Pacific disaster risk finance and insurance program (PICs)	○						
	UNDP	Formulation of pacific disaster net	○						
		Pacific Disaster Risk Management Partnership Network	○						
		Climate change adaptation in the Pacific and Caribbean Area (S-S cooperation)		○					
	UNOCHA	Emergency activities for natural disasters (Vanuatu, Kiribati, Cook Islands, Fiji, Solomon Islands)	○		○	○	○		○
		Climate change adaptation and disaster management	○	○					
	UNESCO	Enhancement of stability and resilience on impact by natural disaster and climate change	○	○					
	UNEP,SP REP	Capacity building on climate change		○					

Notes) PDMCs: Pacific Developing Member Countries (Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, PNG, Samoa, Solomon Islands, Timor- Leste, Tonga, Tuvalu, Vanuatu)
PICs: Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, PNG, Samoa, Solomon Islands, Timor Leste, Tonga

Sources) Project implementation plan (MOFA Japan), JICA's previous reports (Pacific Region) & the Survey Team

As shown in Tables above, cooperation by donors is summarizes as follows.

a) Fiji

Japan, Australia, New Zealand and France are main donors. Much assistance on DRR in general is from Japan, Australia, and New Zealand. The Assistance on weather and earthquakes are only from Japan. For flood control focused on the early flood warning, donors are Japan, France, EU and UNDP.

b) Solomon

Japan, Australia and New Zealand are main donors. Much assistance on DRR in general are from Japan and Australia. The assistance on weather is from Japan, EU and World Bank. Community based cooperation for flood control is assisted by Japan. About countermeasures for flash flood, assistance comes from Australia and the UNDP. Assistance on tsunami and earthquake are from UNDP and ADB.

c) PNG

Australia is the main donor to PNG. The almost whole assistance such as on DRR in general, weather, tsunami, earthquake and volcanic activities are from Australia.

d) Vanuatu

Japan and Australia are main donors. Australia assists the programmes focusing on national disaster prevention plan, disaster risk reduction and climate change. Japan cooperates with weather projects. New Zealand supports on monitoring systems of volcanic activities. France implements study on earthquake.

e) Tonga

Japan assists earthquake and weather projects. The World Bank supports risk management for cyclone.

f) Samoa

Japan and Australia are main donors. Japan assists on weather, whereas Australia assists disaster response.

g) Inter-regional Cooperation

Japan, Australia, New Zealand, EU, and ADB are extending regional support in the Pacific. Among them, Australia is the largest donor and has been supporting the programs on disaster response, national disaster prevention planning and disaster risk reduction. The AusAID is also developing the programs which utilize inter-regional support through the SOPAC SPREP, and NGOs.

Japan assists capacity development for meteorological warning and communication network, capacity development in communities for flood control (Fiji and Solomon) and network building for earthquake observation (Fiji and Tonga). Japan also assists DRR for earthquake and tsunami in Vanuatu and Fiji.

EU supports national disaster prevention planning, climate change adaptation (strengthening capability for adaptation), and disaster mitigation (evaluation of damage potential caused by natural disasters).

New Zealand assists disaster management and monitoring systems on volcanic activities in the Pacific.

With respect to climate change, the ADB established the fund for Pacific Climate Change Adaptation aiming at strengthening adaptation measures, focusing on infrastructural development. The program on mainstreaming environmental issues on economy and development plan for ten (10) countries in the Pacific is also implemented by ADB.

2.6 NGO

2.6.1 Red Cross Societies

Table 2-116 Outline and Activities of Red Cross Society

Country	Outline														
Fiji															
Fiji Red Cross Society	<p>Fiji The Red Cross, consisting of 25 staffs, carries out the emergency urgent rescue activities in case of disaster. There are five divisions in the society.</p> <p>In the whole Fiji, 500 volunteers join the activities of the Red Cross. They are invited every year. As volunteer, younger age forms a major group and there are many teachers as an occupation. There are 15 branches located in in Sigatoka, Nadi, Suva and etc.,</p> <p style="text-align: center;">Outline and Activities of Fiji Red Cross</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Outline & Activities</th> </tr> </thead> <tbody> <tr> <td>1. Headquarters</td> <td>Head Office: Suva Local Office: Located at Sigatoka, Nadi, Lautoka, Ba, Tabua, Lakilaki, (15 Local Offices in total)</td> </tr> <tr> <td>2.Divisions</td> <td>General Affairs, Disaster Management, Health Management, Security management, Coordination for Youth</td> </tr> <tr> <td>3.Staff</td> <td>25 staffs with 50 Volunteer</td> </tr> <tr> <td>4.Activities</td> <td>Emergency relief activities for livelihood and packages supply</td> </tr> <tr> <td>5.Program</td> <td>Disaster Risk Reduction Program</td> </tr> <tr> <td>6.Major Countries for Assistance</td> <td>Australia, New Zealand</td> </tr> </tbody> </table> <p>The roles of the disaster management department are disaster preparedness and disaster response. The disaster risk reduction program is carried out.</p> <p>In accordance with a guideline, the vulnerability of community is analyzed and their initial assessment for damage is investigated.</p> <p>DRR Training in community is carried in focusing on disaster response plan by the volunteers of the branch. Training is done for one week, and it costs F\$120,000-150,000. Other related training for emergency response training is also done for one to two weeks.</p> <p>At the time of disaster occurrence, the Red Cross provides the emergency assistance packs which are stored in the container and which is called a "black pack", The pack contains. Clothing, a shelter, a cooking set, a water container, the sanitary items for women, etc., Supply of food is omitted fundamentally. When packs run short, it they are supplied from the stockpile in the container currently stored at 15 branches. Furthermore, when it also runs short, they are conveyed from the head-quarter of Suva. Such activity of the Fiji Red Cross is based on instructions of Disaster Management Council (DMC).</p> <p>As communication tools at the time of disaster occurrence, telephone, fax, radio, and cellular phone are used. Since there are telephones via satellites connection, even when all the circuits are interrupted, communication does not stop. The communication flows from volunteers to a head of the branch, a head of area headquarters, and finally to headquarter at Suva.</p>	Items	Outline & Activities	1. Headquarters	Head Office: Suva Local Office: Located at Sigatoka, Nadi, Lautoka, Ba, Tabua, Lakilaki, (15 Local Offices in total)	2.Divisions	General Affairs, Disaster Management, Health Management, Security management, Coordination for Youth	3.Staff	25 staffs with 50 Volunteer	4.Activities	Emergency relief activities for livelihood and packages supply	5.Program	Disaster Risk Reduction Program	6.Major Countries for Assistance	Australia, New Zealand
Items	Outline & Activities														
1. Headquarters	Head Office: Suva Local Office: Located at Sigatoka, Nadi, Lautoka, Ba, Tabua, Lakilaki, (15 Local Offices in total)														
2.Divisions	General Affairs, Disaster Management, Health Management, Security management, Coordination for Youth														
3.Staff	25 staffs with 50 Volunteer														
4.Activities	Emergency relief activities for livelihood and packages supply														
5.Program	Disaster Risk Reduction Program														
6.Major Countries for Assistance	Australia, New Zealand														
Solomon															
Solomon Islands Red Cross Society (SIRC)	<p>Red Cross Solomon is supported by Red Cross Societies of Japan, Australia, and New Zealand. There are 30 core staffs. Numbers of registered volunteers are approx. 300.They respond to emergency relief.</p> <p>Under head office in Honiara, there are 3 local branch offices. Each local office and head office are connected by satellite telephone that were supplied by New Zealand. It is functional in case of emergency. It is planned to open new 3 local offices in 2012 with</p>														

	<p>additional 6 staffs.</p> <div style="text-align: center;"> <pre> graph TD HQ[Honiara H/Q] --- Ghizo HQ --- Auk HQ --- Makira HQ --- Buala HQ --- Rennell HQ --- Lata style Makira stroke-dasharray: 5 5 style Buala stroke-dasharray: 5 5 style Rennell stroke-dasharray: 5 5 </pre> <p>(3 local offices will open year 2012) Local Office Allocation of SIRC</p> <p>Emergency relief activities are conducted by following 3 teams.</p> <ol style="list-style-type: none"> ① National Emergency Response Team (NERT) : Set up relief team which are deployed for conducting whole activities. ② Emergency Response Team (ERT) : The team consists of volunteer staffs, for assessing damage/ needs and conducting rescue operation. ③ Regional Disaster Response Team (RDRT) : Whole South Pacific Region is covered for emergency relief. RDRT was sent to cyclone relief in the Philippines and flood relief in Pakistan on year 2011. <p>Under normal condition, the activities are holding community workshop to assess disaster risk and to formulate response plan. Held workshop in 30 communities on 2011. SIRC procured container storages for emergency logistics. 3 water purification plants (including power generator and pressure pump) supplied by Australia were installed in the communities.</p> </div>
Vanuatu	
<p>Vanuatu Red Cross Society</p>	<p>Head Quarter in Port Vila has thirteen (13) officers. It has 6 provincial branches and some provinces have sub-branches. In each branches and sub-branch, there are full time staffs. Funds are provided from AusAID, EU and AFD (Agence Francaise de Developpment). Major fields of activities are as follows;</p> <ol style="list-style-type: none"> 1. Health 2. Climate Change 3 Disaster Risk Reduction <p>DRR activities are done thorough following three (3) programmes.</p> <ol style="list-style-type: none"> 1. Enlightenment for community disaster reduction 2. Humanitarian aid in a time of disaster 3. Disaster response training for volunteers and governmental officers <p>Vanuatu Red Cross has provided result of assessment to NDMO. It was collected by volunteers at each provincial branch. Through coordination meeting information sharing and standardization of the assessment form are done. On the other hand, they are planning to expand sub branches and organizations of volunteers. However it has not progressed due to lack of funds.</p>
Tonga	
<p>Tonga Red Cross Society</p>	<p>In Head Quarter at Nuku'alofa, there are 19 staffs. At each of Vava'u, Ha'apai and Niuatoputapu , 1 personnel stays. New office in Eua will be opened in 2012. The current activities of Tonga Red Cross Society are in accordance with Strategic Plan 2012-2015 made by themselves. In this plan, the activities of Tonga Red Cross Society are categorized into the following items.</p> <ol style="list-style-type: none"> 1)Services to the Community <ol style="list-style-type: none"> a. Disaster Management b. Disaster Responsiveness

	<p>c. Disability Support d. Health Services e. International Humanitarian Law</p> <p>2)Financial Resources and Management 3)Organizational Efficiency and Effectiveness 4)Staff Performance 5)Risk Management</p> <p>As the latest main activities, distribution of bedding such as blankets (555 formulas), hygiene kits (329 formulas), water proof sheets (38 sheets), and lanterns (141 pieces) were conducted to 2,081 disaster victims in 285 households devastated by cyclone "Cyril" and "Jasmine".</p> <p>Although the current problems are as follow, fund acquisition is too difficult to improve the situation.</p> <p>1) The location of the present HQ has low altitude, and whenever heavy rain falls, it is hit by flood. Therefore they have to rescue the relief materials currently stored by all staffs each time to safer places. 2) Storage spaces are not enough although support goods are increased by the assistance of donors.</p>
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2.6.2 Other NGOs

Table 2-117 Outline of Other NGOs

NGO Name	Outline
Solomon Islands	
Oxfam	<p>It opened Solomon Islands office ten (10) years ago. Currently there are seventeen (17) staff. One (1) staff is appointed for disaster management. Funds come from Oxfam Australia. Operation is also managed by Oxfam Australia. Three (3) years budget for disaster management amounts S\$ 3 mil. Major activities are following six (6) areas.</p> <p>1. Disaster Management 2. HIV Campaign 3. Gender Issue 4. Youth Support 5. Economic Support 6. Forestry / Environment Management</p> <p>Disaster management activities are mainly done by following three (3) components. Oxfam provides fund for research, plan and design (implementation design). It also provides and coordination between NDMO and relevant institutes.</p> <p>1. Technical Support for NDMO: Provides support for NDMO. In a time of disaster, four (4) groups will conduct initial assessment / protection for IDP (internally displaced people) / health and welfare support / public service support 2. Community based disaster risk reduction: Budget is very small. However, Oxfam will prepare community response plan such as evacuation plan. 3. Disaster response emergency logistics: Stock disaster relief aid supply. Until now, the aid was provided for cyclone affected areas.</p> <p>Through coordination meeting, Oxfam shares information on CCA / DRR with other NGOs such as Red Cross and Save the Children. For future, bringing in more scientific view to implementation of DRR is planned. Acquiring budget is the most important issue.</p>
Vanuatu	

Humanitarian Team (PHT)	<p>PHT is an association of NGOs and UN organizations such as UNOCHA. PHT implements humanitarian assistance in the Pacific.</p> <p>Currently, annual budget is AU\$ 0.16 mil. One (1) staff is working in the head office. In near future, one (1) more staff will join.</p> <p>VHT conducts coordination among NDMO, NGOs, and donors. Also capacity development for communication is conducted. VHT organizes five (5) clusters (Education, Healthcare/nutrition, Agriculture, Water and Sanitation, Logistics).</p> <p>By employing more staffs and by capacity building for the local staffs, VHT is planning to strengthen coordination capacity through OJT.</p>
CARE international	<p>CARE international is getting fund from DIPECHO (Disaster Preparedness European Commission's Humanitarian Aid Department).</p> <p>CARE international's activities are targeting at schools and vulnerable communities for following activities;</p> <ol style="list-style-type: none"> 1. Reduce risk of disaster by enlightenment through workshop on CCA & DRR (mid and long term preparedness may be improved) 2. Drills, preparation for response, training for emergency treatment, and assessment on affected areas (ability on response may improve) <p>CARE international cooperates with NDMO and organizes workshop. By vulnerability study and preparation for response, CARE international improves preparedness for disaster. From 2011 until 2012, nineteen (19) communities and eleven (11) schools had workshops.</p> <p>Through coordination meeting with other NGOs CARE international work on standardization of training materials. CARE international also coordinates training for NDMO and other relevant institutes.</p>
Tonga	
Civil Society Forum of Tonga (CSFT)	<p>There are 75 local NGOs in Tonga. CSFT is one of those NGOs and was established in 2001. A mission of CSFT is "local people's capacity building, strengthening communication system, disaster information sharing and issuing public opinions to be reflected in the national law".</p> <p>CSFT has 7 staffs (female 5, male 2). Within the member, 1 staff permanently stays in PIANGO (Pacific Islands Association of NGO : Suva, Fiji) .</p> <p>Annual budget is approx. TOP400,000 including staff salary and projects cost.</p> <p>Most of budget is funded by the Global Environment Funds and Pacific Leadership Program (AusAID) which are allocated from NGO's platform PIANGO (every NGO in South Pacific Region should be registered in PIANGO).</p> <p>Following 4 projects are under operation by CSFT.</p> <ol style="list-style-type: none"> ① Eco-tourism in Eua Islands (planting trees and cleaning campaign) ② Marine Conservation Project in Haapai Islands (planting savior trees for salt damage to protect coastal protection) ③ Kids' Education Program in Tongatapu (planting mangrove trees together with PTA to monitoring coastal environment for practical study in the school curriculum) ④ Holding workshop for formulate public opinion to be reflected in the administrative reform which suggested to practically use NGO rather than NEMO. <p>"Strengthening Your Capability" is the most important issue for disaster management and "Take side with the weak such as disables, elders and children to support safe evacuation" is other major task.</p>

Chapter 3 PROBLEMS, ISSUES AND EVALUATION ON DISASTER RISK REDUCTION

3.1 Current Situation of Disaster Risk Reduction in the Countries

The current situation of disaster risk reduction at each country is summarized in the Table3.1-Table3.5. The tables are tabulated by fields of countermeasures and by countries. The tables are summarized as follow.

1) Administration and organizations

In every country except PNG, disaster risk reduction is mainstreamed in a national policy. In every country, the basic act and national plan for disaster risk reduction have been stipulated. National Disaster Council (NDC), and responsible organization for disaster risk reduction on national level, and National Disaster Management Office (NDMO), or its identical agencies, responsible for disaster management on national level, are instituted. During disaster occurrence, and disaster operation center is set up. NDC members are gathered and urgent response is conducted. On the other hand, preparation of SOP and setting up of disaster management organizations on local level are not progressing well. Awareness and knowledge on importance of preparedness in communities are in sufficient.

2) Weather observation and Forecast

Counties except Fiji and Vanuatu fulfill a minimum role by offering own weather observation data to the world through GTS as a member of WMO. The data of these countries is sent to GTS Regional Telecommunication Hub (RTH, either to Melbourne or to Wellington) by e-mail, and these data are provided for GTS by RTH. Obtaining foreign observation data from GTS is impossible. Furthermore, weather observation network itself is vulnerable and it will suffer a great deal of damage by disasters, such as a cyclone and a heavy rain. When it suffers damage, it is easy to fall into the situation that data is no available. Moreover, most upper air observations are not conducted due to budget restriction.

3) Observation of Earthquake and Tsunami Observation

The type of seismograph used in the South Pacific countries is an old analogue type except Fiji and Tonga. In the two countries a digital type was installed by Japan's assistance. Analogue seismograph cannot send real-time data to the head office. It is difficult to analyzing epicenter. A common situation in the region is; ① Information of epicenter and intensity of earthquake is fully dependent on international organization of PTWC and CISN. ② It is difficult to maintain monitoring 24 hours shift due to lack of human resources and budget. ③ Proper maintenance of monitoring equipment is not conducted due to shortage of staff.

4) Cyclone, Flood and Landslide

Preceding to other countries, Fiji has introduced the flood forecasting and warning system. Monitoring for rainfall and river water level is carried out. Forecasting of flood and recommendation for evacuation are practiced in main rivers.

In Salomon, PNG, Vanuatu, and Samoa, monitoring for flood control is not carried out although hydrological monitoring for water use is carried out. In these countries, priority of flood control is low and budget allocation is insufficient. Higher priority is given to water resources development and other sectors. Budget and number of staffs are insufficient.

5) Information and Communication System

Other than PNG, each country has inter-government network (G2G) management body to make information sharing smooth. Between governmental institutes and local government network (G2LG), information-handling capacity becomes very low when it comes to a worst scenario due to disasters; internet connection shut down (no e-mail) and only voice over landline (telephone) available. In visited countries, use of cellphone network in community residents has been very popular. Therefore, capacity of community residents to transmit information will increase. Samoa has incorporated the advanced system, while most of the countries have not yet implemented emergency information liaison system to get advantage of the current advanced changes.

Table 3-1 Current Situation of Disaster Risk Reduction: Administration and Organizations

items country name	National Disaster Management Act	National Disaster Management Plan	SOP national bodies	SOP local bodies	Responsible Agency on National Level	Responsible Agency on Local Level	Disaster Management Agency on National Level	NDMO No. of Staff/ Office Hours	Emergency Response by NDMO	NDMO's Promotion on Awareness, Preparedness
Fiji	Stipulated on 1998	2011 version	Versions on cyclone/ flood/tsunami have been prepared.	Under planning	NDC: National Disaster Council	Provincial DC, Village DC. Responsibility of each organization has not been defined.	NDMO NDMO is doing every effort to fulfill its mission with given resources.	14 staff 24hrs in case of emergency	Emergency Committee is set up. NDMO conducts coordination.	JICA project on DRR in communities level is going on. Capacity in communities has to be developed further.
Solomon	Stipulated on 1989	2010 version	SOP for each cluster of NDOC have been prepared. SOP for each organization is being prepared.	do	do	Provincial DC. Responsibility of each organization has not been defined	do	18 staff 24hrs in case of emergency	Disaster Operation Committee is set up. NDOC is composed of clusters, and conducts coordination.	Disaster education is practiced in radio programmes.
PNG	Stipulated on 1987	Stipulated on 1987 No amendment	No plan for preparation.	No planning for preparation	do	Provincial Disaster Committee, District Disaster Committee	NDC NDC is not conducting sufficient work since disaster risk reduction has not been mainstreamed.	10 staff 24hrs in case of emergency	NDC conducts coordination of relevant organizations.	Not practiced.
Vanuatu	Stipulated on 2000	Action plan (2006 –2016) stipulated on 2006	Preparation by each organization have been planned.	Under Planning	do	In 3 provinces out of the 6, PDCs have been set up. They are under preparation in the remaining 3. ADCs have been under preparation in 75 areas	NDMO Manpower is not enough. NDMO partly depends on NGO and AusAID.	8 staff 24hrs in case of emergency	NDC consisting of 5 clusters has been planned. NDMO conducts coordination.	Due to lack of manpower, the activity is insufficient.
Tonga	Stipulated on 2007	2008 version	Draft has been completed.	Under preparation on provincial and village levels.	do	In every district, District Emergency Management Committee has been set up. In every village, Village EMC has been set up.	NDMO Manpower is not enough.	5 staff Only 1 key person. 24hrs in case of emergency	National Emergency Coordination Center is set up. NDMO conducts coordination.	Planning for emergency response is being made at ministries and schools
Samoa	Stipulated on 2007	Action Plan (2011 –2016) Stipulated on 2007	SOP for warning has been prepared at Met. Div. SOP is under preparation in other agencies.	Disaster Management Plan is being prepared in 362 villages.	do	Village Disaster Councils have been under preparation in 362 villages.	DMO. DMO is doing every effort to fulfill its mission with given resources.	3 staffs 24hrs in case of emergency	National Emergency Coordination Center is set up. NDC members are gathered. DMO conducts coordination.	Disaster education is incorporated in school curriculum. NZAP assists making of tsunami hazard maps and installing warnig sirens at 23 locations.

Table 3-2 Current Situation of Disaster Management: Weather Observation and Forecast

Items country name	Organization for Meteorology	No. of Staff	Work Shift Schedule		Observation				Forecast (Original)		Global Telecommunication System: GTS Forecast
			Observation	Forecast	Manual Observation	AWS	AWOS	Upper Air Observation	Cyclone Path (Potential Track and Position)	Observation	
Fiji	Fiji Meteorological Service	93 staffs	3 shifts (24 hours)	3 shifts (24 hours)	7 stations	15 stations	2 stations	Radar Trucking (Twice a day)	○	○	○
Solomon	Solomon Islands Meteorology Division	50 staffs	3 shifts (24 hours)	Normal 2 shifts (04:00-18:00) Emergency 3 shifts (24 hours)	6 stations	4 stations (to be installed)	Nil	Radio Sonde (Not 365 days)	○	-	Only sending, not receiving
PNG	Papua New Guinea National Weather Service (NWS)	66 staffs	Port Moresby 3 shifts (24 hours) Others 2 shifts (18 hours)	3 shifts (24 hours)	14 stations	10 stations (to be installed)	Nil	Radio Sonde (currently no operation)	○	-	Only sending, not receiving
Vanuatu	Weather Observation/Foreca sting, Vanuatu Meteorology and Geo-hazards Dept.	59 staffs	3 shifts (24 hours)	2 shifts (24 hours)	7 stations	3 stations (planned)	Nil	Radio Sonde (currently no operation)	○	-	Only sending, not receiving
Tonga	Tonga Meteorological Services	28 staffs	3 shifts (24 hours)	3 shifts (24 hours)	7 stations	Nil	Nil	Nil	○	-	Only sending, not receiving
Samoa	Weather /Forecasting section, Meteorology Division (SMD)	51 staffs	3 shifts (24 hours)	Normal 2 shifts (01:00-17:00) Emergency 3 shifts (24 hours)	3 stations	4 stations (existing) 7 stations (under construction)	1 station (under construction)	Wind Profiler (under construction)	○	-	Under construction

Table3-3 Current Situation of Disaster Management: Earthquake / Tsunami Observation

Items Country Name	Earthquake Monitoring Organization	Number of Monitoring Station	No. of Staff/ Office Hours	Tsunami Monitoring Organization	Number of Tide Gauge	Updating of EMWIN	Standby Generator	Organization which Issues Warning	Availability of Hazard Map	Availability of AP (Awareness Program) & SOP
Fiji	Mineral Resources Department	14 Stations CTBT monitor	5 staffs Only daytime	Mineral Resources Department	2 stations	Upgraded EMWIN-II	Nil (MRD)	NDMO	Under preparation by SOPAC	AP (JICA, SOPAC, NDMO) SOP Evacuation drill in the school
Solomon	Seismology Section, Geology Department	3 stations (working 2 stations) CTBT monitor	4 staffs Only daytime	Solomon Islands Meteorology Div., NDMO	4~5 stations (Australia's initiative) data accessible	Upgraded EMWIN-II (NDMO)	Nil (GDSS)	NDMO	Nil	Nil
PNG	Geo-hazards Div., Department of Mineral Resources and Geo-hazards Management (DMPG)	3 stations (Shortly installed 10 new stations by EU) CTBT monitor	35 staffs, Only daytime but staff compound	Geo-hazards Div. DMPG	2 stations (Australia's initiative) data accessible	Upgraded EMWIN-II	Nil (DMRGM)	NDC	Nil	Nil
Vanuatu	Geo-hazards Monitoring, Vanuatu Meteorology and Geo-hazards Department (VMGD)	3 stations / 6 volcanic monitoring stations CTBT monitor	9 staffs for geo-hazards monitoring Met. 24hrs	Geo-hazards Monitoring, VMGD	2 stations	Upgraded EMWIN-II	Installed	NDMO	Partially	Under processing
Tonga	Geological Service Unit	5 stations (working 3 stations) No CTBT monitor (Tonga & Tuvalu)	7 staffs (1 seismologist) Only daytime	Geological Service Unit, Meteorology Service, NEMO	1 station	EMWIN not upgraded yet	Installed	NEMO	Nil	Nil
Samoa	Geology/Geophysics Section, Meteorology Division (SMD)	1 Station (6 New stations are under construction)	6 staffs Work only daytime	Geology / Geophysics Section, SMD	1 station (existing) 1 station (under construction)	Updated EMWIN-II Located at Weather/Fore casting Sec.	Under construction	SMD	Partially	Disaster Management Office of SMD

Table3-4 Current Situation of Disaster Management: Cyclone, Flood and Landslide

Items Country name	Monitoring Organization	Number of Monitoring Station	No. of Staff/ Office Hours	Organization for Countermeasures	No. of Staff/ Office Hours	Warning System	Organization which Issues Warning	Availability of Hazard Map for Flood	Availability of AP (Awareness Program) & SOP
Fiji	Fiji Water Authority, Hydrological Section	110 Rain gauges 87 Water level recorders	26 Staffs /daytime	Ministry of Primary Industries, Department of Agriculture	Daytime only	5 rivers	NDMO	Nil	Available
Solomon	Ministry of Mines, Energy and Rural Electrification	5 Rain gauges 2 Water level recorders for water resource development	7 Staffs /daytime	Ministry of Infrastructure Development	10 staffs, 14 Assistant staffs /daytime	Not introduced	NDMO	Nil	Nil
PNG	Dept. of Environment and Conservation	3 Rain gauges 2 water level recorders for water resources development	4 Staffs /daytime	Dept. of Works	No staff	Not introduced	NDC	Nil	Nil
Vanuatu	Dept. of Water Resources	5 rain-gauges for water resources development, M/P for WR is formulated.	3staffs /daytime	Dept. of Public Works	No staff	Not introduced, Difficult for forecasting because of steep rivers	NDMO	Nil	Nil
Tonga	Nil	Nil	No staff	Min. of Works	No staff	No river in Tonga	NEMO		Nil
	Nil	Nil	No staff	PUMA	17staffs	Poor drainage in low-lying areas along coast		Preparing hazard maps	Nil
Samoa	Water Resources Div.	13 Rain gauges 17 Water levels For water resources development	7 staffs /daytime	Land Management Div.	1 staff	Not introduced, Flash flood in cities	DMO	Nil	Nil

Table 3-5 Current Situation of Disaster Management: Information / Communication System

Items Country name	G2G Network	G2G Network Maintaining Organization	G2G Network Main Line	G2G Network Sub-Line	Emergency Information System	G2LG Network Main Line	G2LG Network Sub-Line	Cellphone Subscribers per 100 population*	G2C Infrastructure
Fiji	eGovernment	Ministry of Finance, ITC section	Fiber Optic Network and Land Line Network	Cellphone Network	Nil	Cellphone Network	HF Radio	116.19	TV, Radio, SMS
Solomon	No Name	ICT Support Unit, Ministry of Finance & Treasury	Fiber Optic Network	Wifi Network or Microwave Network	Nil	HF Radio	Nil	5.57	Radio, SMS
PNG	Nil	Nil	Land Line Network	Nil	Nil	Land Line Network	Nil	27.84	Radio
Vanuatu	eGovernment	Dept. of Finance & Treasury, Ministry of Finance & Economic Management	Fiber Optic Network	Microwave Network	Nil	Cellphone Network	HF Radio	119.05	Radio, Siren System
Tonga	Nil	Ministry of Information & Communications	Land Line	Cellphone Network	Prototype Under Construction	Cellphone Network	HF Radio	52.18	Radio, SMS
Samoa	No Name	IT Unit, Ministry of Natural Resources, Environment and Meteorology	Optic Fiber Network	Wifi Network	ALARTS	Cellphone Network	VHF Radio	91.43	Radio, SMS, Siren System

3.2 Problems, Issues and Evaluation on Disaster Risk Reduction in the Countries

The problems, issues and evaluation of disaster risk reduction in each country are described in the following tables. The tables are summarized as follow.

1) Administration and Organizations

The capacity of NDMOs is needed to be developed further, as the scale of NDMO is small in each country and the resources should be utilized at its maximum. Making SOP in disaster related organizations, establishing local administrative systems and promotion of awareness/preparedness in communities are urgent issues. In PNG, disaster risk reduction should be mainstreamed in national policy.

2) Weather Observation and Forecast

It is the common problem of the Pacific that the upper air observation cannot be stably conducted due to financial problem except Samoa where a wind profiler is provided by Japan's grant aid. In order to increase the precision of numerical weather prediction, improvement of this situation is required. Fiji, Vanuatu, Salomon, and Papua New Guinea have concrete plans for improvement of weather observation network with assistance by donors while there is no such plan for Tonga. Tonga needs to improve this situation..

3) Earthquake and Tsunami Observation

Since observational data are not be monitored by 24 hours shift except in Tonga, collecting information and issuing tsunami warning will be delayed if an earthquake occurs in off-duty time. In some remote islands, radio broadcast or mobile phone are not in service. It is impossible to transmit warning announcement without such system to these islands. Maintenance of the equipment at distant places is difficult due to lack of funds and staff. The operation is suspended until proper maintenance has been done. The countries can receive information of far-tsunami from PTWC and/or CISN, while monitoring system for near-tsunami is needs to be improved.

4) Cyclone, Flood and Landslide

Fiji has reached a certain level in hydrological monitoring and flood forecasting. However, in any of the visited countries, an integrated organization which manages disaster risk reduction for flood and landslide does not exist. There is no engineer specialized in flood control. Instituting an integrated organization for flood control and an employment of engineers are the issues to be solved with high priority.

5) Information and Communication System

There are remote islands and areas where warning does not reach due to uncompleted network by national radio broadcast or mobile telephones. The network in inter-governmental

institutes (G2G), the network between governmental institutes and local government (G2LG), and the network between governmental institutes and citizens (G2C), need redundancy. In most countries, adding diversity to network equipment is the number one priority. In most of the cases, hardware component is advanced, while software components such as organizational formation and capacity building are the remaining issues. In information gathering at affected sites, capacity development of NDMO to utilize IT services and IT literacy improvement of community inhabitants are major issues. Currently, Samoa and Fiji have been most advanced in this area.

Qualitative evaluation is conducted based on the index below.

Table 3-6 Index for Evaluation

A	B	C	D
Sufficient countermeasures are conducted.	Minimum countermeasures are conducted	Countermeasures are insufficient. Responsible organization(s) exists, or partly exists, but there have been no activity.	There is no responsible organization or staff.

Table 3-7 Problems, Issues and Evaluation: Administration and Organizations

	Laws and Plans	National Administration	Local Administration	Urgent Response	Warning System	SOP National Level	SOP Local Level	awareness	Capacity of NDMO Staff
Fiji - B	Basic laws and Plans are stipulated and revised: National Disaster Risk Management Plan, National Disaster Management Act	Basic administrative organizations are instituted: NDC, NDMO	Disaster councils on provincial level and village level are established.	National Emergency Operation Center (NDMC) is set up, NDC members are gathered and NDMO conducts coordination. NDMC shows its efficiency.	Response to emergency such as tsunami is difficult, since the warning is issued through NDMO. Use of SMS is the issue.	SOP have been prepared by various kinds of disasters.	Planned to be prepared.	Community DRR has been conducted by JICA and AusAID. Evacuation drill was conducted in schools. Awareness needs to be promoted in communities.	Disaster education in schools and communities should be enhanced to promote preparedness. Capacity development in Ministry of Education staffs is needed.
	A	A	A	A	B	B	C	B	B
					Short Term Issue	Mid-term Issue	Mid-term Issue	Long Term Issue	Long Term Issue
Solomon - B	Basic laws and Plans are stipulated and revised: National Disaster Act, National Disaster Plan	Basic administrative organizations are instituted: NDC, NDMO	Provincial disaster councils are established.	NDMC is set up, and conducts response by clusters. NDMO conducts coordination under direction of NDC. NDMC shows its efficiency.	Radio broadcast is only the tool. Alternative method is needed for issue of warning to remote islands.	SOP by NDMC clusters have been prepared. SOPs for every organization are under preparation.	Planned to be prepared.	Community DRR has been conducted by JICA and AusAID. Awareness needs to be promoted in communities.	Capacity development of NDMO staffs, and communities are needed.
	A	A	A	A	B	B	C	B	B
					Short Term Issue	Mid-term Issue	Mid-term Issue	Long Term Issue	Long Term Issue
PNG - C	Basic laws and Plans are stipulated, but need to be revised.: National Disaster Management Act, Disaster Management Plan	ND Council is established. ND Center is not very active.	Disaster councils on provincial level and district level are established. However, they are only nominal, since DRR is not mainstreamed.	Under ND Council, ND Center conducts coordination. However, ND Center does not show much efficiency.	Radio broadcast is only the tool. Alternative method is needed for issue of warning to remote islands.	No SOP exists	No SOP exists. There is no plan for preparation.	Awareness needs to be promoted in communities.	NDC has minimum number of staffs, but lacks in initiative, as DRR has not been mainstreamed.
	B	B	B	B	B	C	C	C	C
	Short Term Issue		Short Term Issue		Mid-term Issue	Mid-term Issue	Mid-term Issue	Long Term Issue	Long Term Issue

	Laws and Plans	National Administration	Local Administration	Urgent Response	Warning System	SOP National Level	SOP Local Level	awareness	Capacity of NDMO Staff
Vanuatu - B	Basic laws and Plans are stipulated and revised: Disaster Management Act, Disaster Management National Action Plan	Basic administrative organizations are instituted: NDC, NDMO	In 3 provinces of the 6, DCs are instituted. Establishing DC in areal level is also progressing.	Disaster Emergency Center is going to be established. At present NDMO functions as the center's coordinating body.	Communication with remote islands is the problem.	SOPs are prepared for VMGD and volcanic disasters.	No SOP exists.	Disaster education in communities is needed.	NDMO depends on NGOs. Capacity development is needed in manpower. Capacity development in awareness and response are needed.
	A	A	B	A	B	C	C	C	B
					Middle Term Issue	Middle Term Issue	Middle Term Issue	Long Term Issue	Long Term Issue
Tonga - B	Basic laws and Plans are stipulated and revised: National Disaster Management Act, National Emergency Management Plan	Basic administrative organizations are instituted: NDC, NEMO	In every province, DC has been established. At every village, village emergency management committee is established.	National Emergency Operation Center (NEOC) is set up, NDC members are gathered, and NDMO functions as coordinating body. NEOC shows minimum efficiency.	Met. Service. has 24hrl shift for tsunami warning.	SOPs are being prepared nationwide.	SOP for provinces are under preparation.	Radio Broadcast is used. Activities for awareness is limited due to limited number of staffs in NDMO.	Assistance for capacity development of manpower in awareness is needed. Only one key person in NEMO is not enough.
	A	A	A	B	B	B	C	B	C
						Middle Term Issue	Middle Term Issue	Long Term Issue	Long Term Issue
Samoa - B	Basic laws and Plans are stipulated and revised: Disaster and Emergency Management Action plan for DRM	Basic administrative organizations are instituted: NDC, NEMO	Out of all villages of 362 in the country, village councils are instituted in 50 villages.	NEDC is set up, NDC members are gathered, and NEMO conducts coordination. NEDC shows its efficiency.	Use of SMS is progressing. Sirens are installed by NZAP.	SOP has been prepared in Met. Div. for warning issue.	No SOP exists.	Disaster education is incorporated into curriculums of primary and secondary schools. Hazard maps were made in 8 locations by NZAP.	There are only 3 staffs. But they have high spirit. Capacity development in awareness, preparedness, and response is progressing.
	A	A	B	A	B	B	C	B	B
					Middle Term Issue	Middle Term Issue	Middle Term Issue	Long Term Issue	Long Term Issue

Table 3-8 Problems, Issues, and Evaluation: Weather Observation and Forecast

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Assistance from Donor
Fiji - B	Since the deteriorated observation equipment cannot be replaced due to lack of finance, it is harmful to observation activity. Since the deteriorated calibration instrument cannot be replaced, the accuracy of observed data is not secured	Dedicated link of telecommunication company is frequently disconnected during tropical cyclones and floods.	Deteriorated network equipment and cables influence smooth data exchange in FMS Head Office.	Nil	Nil	Expansion of the training facility in FMS Head Office is required in order to conduct technical trainings for the Pacific countries and FMS facility tours for local students. Manpower and equipment to transfer from paper-based data to electronic data are insufficient.	By the Japan's Grant Aid, Meteorological equipment will be provided.
	B	B	B	A	A	B	—
	Short Term Issue	Short Term Issue	Short Term Issue	—	Short Term Issue	Short Term Issue	—
Solomon - B	Since Upper Air Observation equipment (Radiosonde) is not procured due to lack of finance, upper air observation cannot be conducted. Since the technical training of manual observation is not done, the accuracy of the observed data is not secured.	Since SMD has dependency on internet service of the local provider for obtaining the observed data from overseas, an alternative communication methods considering internet stoppage in the emergency case is required.	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.	SMD cannot forecast appropriately due to lack of consecutive upper air observed data, surface observation points and observed data.	Since SMD has dependency on internet service of the local provider for distributing the observed data to overseas, an alternative communication method considering internet stoppage in the emergency case is required.	In order to utilize the broadcast time of national radio station effectively, recording instruments in SMD Head Office and presentation technique are required.	By the assistance of UNDP, AWS (4) and rain gauges (12) will be installed on 2012
	B	B	B	B	B	B	—
	Short Term Issue	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Short Term Issue	—
PNG - B	Since Upper Air Observation equipment (Radiosonde) is not procured due to lack of finance, upper air observation cannot be conducted.	Since GTS and internet service are not available, NWS cannot obtain the observed data from overseas.	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.	NWS cannot forecast appropriately due to no upper air observed data, surface observation points and observed data.	Since NWS has dependency on fax service for distributing weather information, an alternative distribution method considering fax stoppage in the emergency case is required.	Nil	By the assistance of EU, AWSs (5) and Rain gauges (20) will be installed in 2012. By the assistance of World Bank, AWS (4) will be installed in 2012. By the assistance of AusAID, AWS (1) will be installed in 2012.
	B	B	B	B	B	—	—
	Short Term Issue	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Assistance from Donor
Vanuatu - B	Since Upper Air Observation equipment is not procured due to lack of finance, upper air observation cannot be conducted. Since VMD does not have many observation points due to lack of finance, the observed data is not enough.	Since VMD has dependency on internet service of the local provider for obtaining the observed data from overseas, an alternative communication method considering Internet stoppage in the emergency cases is required.	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.	VMD cannot forecast appropriately due to no upper air observed data and lack of surface observation points and observed data.	Since VMD has dependency on Internet Service of the local provider for distributing the observed data to overseas, an alternative communication method considering Internet stoppage in the emergency case is required.	Nil	AWOS (2) and AWS (5) will be requested for Japan's grant aid..
	B	B	B	B	B	—	—
	Short Term Issue	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—
Tonga - B	Since Upper Air Observation equipment is not procured due to lack of finance, upper air observation cannot be conducted. Since Observation elements (only temperature measured by psychrometer and rain) except Tonga Tapu don't satisfy the standard of Synoptic Observatory (temperature, rainfall, wind direction & wind velocity, atmospheric pressure, humidity, sunshine duration and solar radiation).	Observed data from each observatory are not available timely since fixed telephone lines and mobile phone lines are unstable.	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.	TMS cannot forecast appropriately due to no upper air observed data and lack of surface observation points and observed data.	Since the number of staff is limited and the distribution methods are not automated and different by each user (Website, e-mail, SMS, Fax), information distribution work is not conducted effectively in short time. The observed data from overseas cannot be obtained since GTS is not connected.	Nil	Nil
	B	B	B	B	B	—	—
	Short Term Issue	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—
Samoa - B	Since Upper Air Observation equipment is not procured due to lack of finance, upper air observation cannot be conducted. Since VMD does not have many observation points due to lack of finance, the observed data is not enough.	Since SMD has dependency on internet service of the local provider for obtaining the observed data from overseas, an alternative communication method considering Internet stoppage in the emergency case is required.	Analyzing and processing method of the observed data is not established and the preparation of equipment necessary for analyzing and processing is required.	SMD cannot forecast appropriately due to no upper air observed data and lack of surface observation points.	Since SMD has dependency on fax service for distributing weather information, an alternative distribution method considering fax stoppage in the emergency case is required.	Nil	By the Japan's Grant Aid, AWS (7), AWOS (1), Upper Air Observation System "Wind Profiler" (1), GTS Message Switch (1), Sea Level Gauge (1), Wireless LAN Network (1) will be provided in 2012
	B	B	B	B	B	—	—
	Short Term Issue	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—

Table 3-9 Problems, Issues and Evaluation: Earthquake / Tsunami Observation

	Observation	Communication	Analysis / Process	Data Transmission	Others	Donor's Assistance
Fiji - B	Frequent breakdown of observation equipment. Lack of skill for maintenance of equipment. Monitoring of observation data is not conducted 24 hours due to shortage of human resources. Notice of the warning is delayed when event happens out of business hours.	Obtaining of the far-earthquake information from international organization is relying on internet service by domestic provider. Back-up transmission lines is necessary for emergency cases.	System for judgment of tsunami prediction from the earthquake is not established.	Earthquake information notice to the people via NDMO (not direct from MRD). Delay of emergency notice for evacuation and response is probable.	Improper maintenance of observation equipment due to shortage of staff.	Seismic network system between Tonga and Fiji to share the information was established by Japan's grant aid in 2011. Equipment for disaster prevention, risk reduction and recovery will be procured by Japan's grant aid project.
	B	B	B	A	B	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Short Term Issue	—
Solomon - B	Monitoring of observation data is not conducted 24 hours due to shortage of human resources. Notice of the warning is delayed when the event happens out of business hours.	Obtaining the far-earthquake information from international organization is relying on internet service by domestic provider. Back-up transmission lines is necessary for emergency cases.	System for judgment of tsunami prediction from the earthquake is not established. Technology, knowledge and facilities for analysis of tsunami prediction are lacking.	Earthquake information notice to the people via NDMO (not direct from Geology Dep't). Delay of emergency notice for evacuation and response is possible.	Lack of basic knowledge for analyzing an earthquake and tsunami observation data. Current situation is just watching seismograph monitor installed by the international donor.	No plan/programme
	B	B	B	A	C	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Mid-term Issue	—
PNG - B	Monitoring of observation data is not conducting 24 hours due to shortage of human resources. Delayed notice of the warning is probable, when event happened out of business hours.	Obtaining the far-earthquake information by international organization is relying on internet service by domestic provider. Back-up transmission lines is necessary for emergency cases.	System for judgment of tsunami prediction from the earthquake is not established. Technology, knowledge and facilities for analysis of tsunami prediction are lacking.	Earthquake information notice to the people via NDC (not direct from MPGM). Delay of emergency notice for evacuation and response is probable.	Although the seismograph granted by EU already procured, negotiation with a telecom company is undergoing hardship and installation work is not foreseeable.	New 10 earthquake observation stations and analysis equipment were supplied by EU.
	B	B	B	B	B	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Short Term Issue	—

	Observation	Communication	Analysis / Process	Data Transmission	Others	Donor's Assistance
Vanuatu - B	Facilities for transmitting observed data to the H/Q in real-time is not available. Therefore specifying the epicenter cannot be carried out in short time for even near-tsunami.	Obtaining the far-earthquake information by international organization is relying on internet service by domestic provider. Back-up transmission lines is necessary for emergency cases.	System for judgment of tsunami prediction from the earthquake is not established. Technology, knowledge and facilities for analysis of tsunami prediction are lacking.	Earthquake information notice to the people via NDMO. But delay for notice for evacuation and response is not expected because NDMO and VMGD are in the same building, which makes mutual contact easy in emergency. Cellular-phone SMS to transmit tsunami warning is under negotiation with a cellular phone company.	VMGD originally proposed South Pacific Regional Seismic Network (ORSNET)	Equipment for disaster prevention, risk reduction and recovery will be procured by JICA's grant aid project. Equipment for the Vanuatu Tsunami Warning System will be procured by World Bank's assistance project.
	B	B	B	A	B	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Short Term Issue	—
Tonga - B	Monitoring of observation data is not conducted 24 hours due to shortage of human resources. Delayed notice of the warning when event happens out of business hours is probable.	Obtaining the far-earthquake information by international organization is relying on internet service by domestic provider. Back-up transmission lines are necessary for emergency cases.	System for judgment of tsunami prediction from the earthquake is not established. Technology, knowledge and facilities for analysis of tsunami prediction are lacking.	An earthquake and tsunami information is transmitted to the people through national radio service. But most of remote islands are not receiving radio broadcast.	It is difficult to access remote stations for maintenance. It's not easy to identify out-of-order of monitoring system because of only one dedicated staffs in charge of maintenance for equipment.	Seismic network system between Tonga and Fiji to share the information was established by JICA's grant aid in 2011.
	B	B	B	B	C	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—
Samoa - A	Monitoring of observation data is not conducted 24 hours due to shortage of human resources. Delayed notice of the warning is probable, when event happens out of business hours.	No specific topic	System for judgment of tsunami prediction from the earthquake is not established.	No specific topic	No specific topic	6 earthquake observation stations with network system will be established by the end of April, 2012 by Chinese assistance.
	B	A	B	A	A	—
	Short Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	—	—

Table 3-10 Problems, Issues, Evaluation: Cyclone, Flood and Landslide

	Institution	Engineers/ Staffs	Hydrological Monitoring	Flood Forecast & Warning System	Information Communication	Non-Structural Measures	Structural Measures	Community based DRR
Fiji- B	WAF is in charge of hydrological monitoring, while MOA is in charge of countermeasures. An organization differs between monitoring and planning.	Insufficient staffs who mastered river engineering	WAF monitors rainfall and WL in the river. No compatibility among the observation equipment.	FFW is conducted in 5 rivers. Shortening of time for forecasting is required.	Mail, fax, phones are used in the government offices. Radio is used for communities. SMS is under preparation	No preparation for hazard map. Land use regulation will be examined for IWRM	River excavation and dredging are done by MOPI Budget is small.	Being implemented by JICA in Ba River. Extension to other basins is needed. Effect of execution of PCIDRR by AusAID needs to be sustained.
	B	B	A	A	B	C	B	B
	Long Term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Short Term Issue	Short Term Issue	Long Term Issue	Mid-term Issue
Solomon - B	No organization which is implementing the hydrological monitoring for flood prevention. Monitoring aims at water resources development. No organization plans or implements countermeasures.	No engineers for flood control (hydraulics, river engineering, runoff analysis)	Monitoring for water resource development and hydro-power generation are done by WRD. Data for monitoring is checked every three months by staffs. Few staffs for monitoring.	Simple forecasting system using rain-gauges and staff gauges in JICA project is carried out.	Mail, fax, phones are in use in the government offices. Radio is used for communities.	No measures for flood control. Simple forecasting system using rain-gauges and staff gauges in Umasani River is introduced aid by JICA project .	No measures	Being implemented by JICA in Umasani River. Effect of execution of PCIDRR by AusAID needs to be sustained.
	C	D	B	B	B	C	C	B
	Long Term Issue	Long Term Issue	Mid-term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Long Term Issue	Short Term Issue
PNG - C	No organizations which is implementing the hydrological monitoring for flood prevention. Monitoring by WRB aims at water resources development. No organization plans or implements countermeasures.	No engineers for flood prevention (hydraulics, river engineering, runoff analysis)	Monitoring for water resource development and hydro-power generation are done by WRB. Data for monitoring is checked every three months by staffs. Difficult for 4 staffs for monitoring.	No system	Mail, fax, phones are in use in the government offices. Radio is used to transmit communities.	No measures	No measures	No execution
	C	D	C	D	B	C	C	C
	Long Term Issue	Long Term Issue	Short Term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Long Term Issue	Mid-term Issue

	Institution	Engineers/ Staffs	Hydrological Monitoring	Flood Forecast & Warning System	Information Communication	Non-Structural Measures	Structural Measures	Community based Disaste Prevention
C - Vanuatu	No organizations which is implementing the hydrological monitoring and flood prevention. Monitoring by DOWR aim at water resources development. DOWR makes planning for basin control.	Only one engineer for flood prevention	Monitoring for water resource development and water supply is done by DOWR. Data for monitoring is checked every three months by staff. Difficult for monitoring due to few staffs	No system	Mail, fax, phones are in use in the government offices. Radio is used for communities.	No measures	No measures	Effect of execution of PCIDRR by AusAID needs to be sustained
	C	D	C	D	B	C	C	B
	Long Term Issue	Long Term Issue	Short Term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Long Term Issue	Mid-term Issue
C - Tonga	MWDRA is in charge of infrastructure for preparedness. However no engineer exists. Budget is small.	Floods and poor drainage are remarkable in capital. No engineer for flood control.	No hydrological monitoring for flood control	No system	Mail, fax, phones are in use in the government offices. Radio is used for communities.	Hazard maps are under preparation by PUMA	No measures	Need for sustained an effect by execution of PCIDRR
	C	D	D	D	B	C	C	B
	Long Term Issue	Long Term Issue	Short Term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Long Term Issue	Mid-term Issue
C - Ssmoa	MONRE monitors rainfall and WL aiming at water resource development and basin management. No measures for flash floods in 4 rivers in Apia	No engineer for flood control.	No hydrological monitoring for flood control	No system	Mail, fax, phones are in use in the government offices. Radio is used for communities. Use of SMS is popular.	Watershed Management Plan is formulated. Legal affaire will be an issue in future.	Bank protection for rivers and coasts are done.	No execution
	C	D	D	D	A	C	B	C
	Long Term Issue	Long Term Issue	Short Term Issue	Long Term Issue	Short Term Issue	Mid-term Issue	Long Term Issue	Mid-term Issue

Table 3-11 Problems, Issues, Evaluation: Information / Communication System

	Organization	Human Resource	G2G Network	G2LG Network	G2CNetwork	Disaster Warning	Information Liaison	Community
Fiji - B	Inter-government network exists. With mid & long term strategy infrastructure development is being implemented	No disaster response specialist to manage IT infrastructure. In mid & long term, development of system and operation may face difficulty.	Observatory institutes are spread around Suva and Nadi in Viti Levu island. They are depending on landline network which has high risk of disconnection during disaster.	Cellphone network and HF radio network is in place,	Radio broadcasting network covers whole nation is in place.	Radio broadcasting and TV broadcasting are the major tools to receive emergency warning. Warning using SMS is in service but SOP, and MOU are not yet ready.	Human-intensive data gathering system is in place. It takes longer time.	Communication infrastructure such as a cellphone network service is developed. But the system is not fully utilized..
	B	B	B	A	A	B	B	B
		Short term issue	Mid-term issue			Short term issue	Short term issue	Short term issue
Solomon - C	Governmental institutes have overall business continuity plan and they are implementing development.	There are few resources in local area. Therefore, implementation of network infrastructure has very little progress in local area.	Honiara area (nation capital) has project to improve network environment. Inter-government communication infrastructure may improve significantly.	Local government depends on HF radio network.	There is nation-wide network. But coverage of radio network is decreasing due to no renewal of broadcasting equipment.	Radio broadcasting is the most major tool to receive warning. Warning using SMS is in service.	Human-intensive data gathering system exists. But information management is less efficient.	Coverage of cellphone network is limited.
	B	C	B	C	C	B	C	D
		Mid-term issue	Mid-term issue	Mid e term issue	Mid-term issue	Mid-term issue	Mid-term issue	Mid-term issue
PNG - D	Governmental institutes have no comprehensive strategy to implement inter-government network.	Human resources are kept in each institute separately. There is rarely cooperation between institutes.	Increasing communication cost drives institutes to down grade communication environment.	Same as left	Same as left	Radio broadcasting is the most major tool to receive warning.	There is no data gathering system. In addition, network environment is bad. Therefore, head-quarter have to set up field office during disasters.	Coverage of cellphone network is limited.
	D	D	D	D	C	C	D	D
		Short term issue	Mid-term issue	Long term issue	Long term issue	Long term issue	Long term issue	Long term issue

	Organization	Human Resource	G2G Network	G2LG Network	G2CNetwork	Disaster Warning	Information Liaison	Community
Vanuatu - B	Inter-government network exists. With mid & long term strategy infrastructure development is being implemented	Basically human resources are limited. By cooperation with NGO and by consolidating human resources, sufficient operation is secured..	VMGD and NDMO are placed in same building and seamless network environment is in place.	Partially remote islands are out of HF radio network coverage. In general network environment is in place.	Radio broadcasting network covers almost whole nation.	Radio broadcasting and siren system are utilized for disaster warning.	There is a human-intensive data gathering system. It depends on information provided by NGO.	Cellphone network is developed. But the system is not fully utilized.
	B	B	A	B	B	B	C	B
		Mid-term Issue		Mid-term Issue	Mid-term Issue	Mid-term Issue	Mid-term Issue	Short term Issue
Tonga - B	Ministry of Information and Communication is going to develop Inter-government network with mid & long term strategy.	Basically human resources are limited. Operation depends on a Japanese senior volunteer.	Redundant network environment is in place.	Cellphone network and HF radio network is in place.	Radio broadcasting network with 24h airing covers whole nation.	Radio broadcasting and TV broadcasting are the major tool to receive warning. SMS has been utilized for warning. Channel of information is partially inefficient.	Prototype information management system with sirens is under construction.	Cellphone network service is expanding quickly. Near future the system will be utilized more.
	C	B	B	B	A	B	C	C
	Short term Issue	Mid-term Issue				Short term Issue	Mid-term Issue	Short term Issue
Samoa - A	Inter-government network maintained by Ministry of Mineral Resources exists. With mid & long term strategy infrastructure development is being developed	IT system is operational and efficient with limited human resources.	Redundant network environment is in place.	Cellphone network and VHF radio network is in place.	Radio broadcasting network covers whole nation.	Radio broadcasting is the major tool to receive warning. Warning system using SMS and sirens are under development.	Information management system with cellphone network is in place.	Cellphone network service is widely utilized. It is used for information gatherings. NDMO have prepared education material and organizing volunteers.
	A	A	A	A	A	A	A	A
							Short term Issue	Short term Issue

G2G: Governmental institute to Governmental institute, G2LG: Governmental institute to Local Governmental institute, G2C: Governmental institute to Citizens

Table 3-12 Evaluation on Administration and Organizations

	Laws and Plans	National Administration	Local Administration	Urgent Response	Warning System	SOP National Level	SOP Local Level	awareness	Capacity of NDMO Staff	Over All Evaluation
Fiji	A	A	A	A	B	B	C	B	B	B
Solomon	A	A	A	A	B	B	C	B	B	B
PNG	B	B	B	B	B	C	C	C	C	C
Vanuatu	A	A	B	A	B	C	C	C	B	B
Tonga	A	A	A	A	B	B	C	B	C	B
Samoa	A	A	B	A	B	B	C	B	B	B

Table 3-13 Evaluation one Weather Observation and Forecast

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Assistance from Donor	Over All Evaluation
Fiji	B	B	B	A	A	B	—	B
Solomon	B	B	B	B	B	B	—	B
PNG	B	B	B	B	B	—	—	B
Vanuatu	B	B	B	B	B	—	—	B
Tonga	B	B	B	B	B	—	—	B
Samoa	B	B	B	B	B	—	—	B

Table 3-14 Evaluation on Earthquake / Tsunami Observation

	Observation	Communication	Analysis	Forecast	Distribution of Information	Others	Assistance from Donor	Over All Evaluation
Fiji	B	B	B	A	B	—	B	B
Solomon	B	B	B	A	C	—	B	B
PNG	B	B	B	B	B	—	B	B
Vanuatu	B	B	B	A	B	—	B	B
Tonga	B	B	B	B	C	—	B	B
Samoa	B	A	B	A	A	—	A	A

Table 3-15 Evaluation on Cyclone, Flood and Landslide

	Institution	Engineers/ Staffs	Hydrological Monitoring	Flood Forecast & Warning System	Information Communication	Non-Structura l Measures	Structural Measures	Community based Disaste Prevention	Over All Evaluation
Fiji	B	B	A	A	B	C	B	A	B
Solomon	C	D	B	B	B	C	C	A	B
PNG	C	D	C	D	B	C	C	C	C
Vanuatu	C	D	C	D	B	C	C	B	C
Tonga	C	D	D	D	B	C	C	B	C
Samoa	C	D	D	D	A	C	B	C	C

Table 3-16 Evaluation on Information / Communication System

	Organization	Human Resource	G2G Network	G2LG Network	G2CNetwork	Disaster Warning	Information Liaison	Community	Over All Evaluation
Fiji	B	B	B	A	A	B	B	B	B
Solomon	B	C	B	C	C	B	C	D	C
PNG	D	D	D	D	C	C	D	D	D
Vanuatu	B	B	A	B	B	B	C	B	B
Tonga	C	B	B	B	A	B	C	C	B
Samoa	A	A	A	A	A	A	A	A	A

3.3 Summary of Current Situations and Issues on Disaster Risk Reduction in the Countries

Current situations and issues of disaster risk reduction in each country are summarized below. Details are described in the following tables.

1) Administration and Organizations

SOP preparation is urgently needed. Scale of offices in charge of disaster management such as NDMO is small. In order to make their performance efficient, capacity of the organizations is needed to be developed further. In parallel, capacity of communities has to be enhanced since countermeasures by administration are limited. There are some countries, such as Fiji and Samoa, where disaster education is incorporated into school curriculums, which proved effective.

2) Weather Observation and Forecast

Most of the meteorological organizations in the region don't have upper air observation data. Moreover, since the number of observation points and quantity of observed data are insufficient, the weather phenomenon of its own country cannot be grasped exactly, and weather forecast cannot be carried out appropriately. The weather forecast cannot be carried out efficiently since analyzing and processing method of the observed data is not established. Upper air observation by wind profiler is recommended as that maintenance cost is cheaper. It is necessary to establish GTS connection in order to obtain meteorological data stably at a moderate cost.

3) Earthquake and Tsunami Observation

Technical levels of monitoring varies by counties. Establishing own monitoring network in the country and sharing the observed data within the region is the key issue. Establishment of forecasting system for the possibility of tsunami occurrence caused by near-earthquake is needed.

4) Cyclone, Flood and Landslide

Although cyclone flood, and landslide occur, it is a problem that a responsible organization for planning and implementing the countermeasures does not exist in any of the visited countries except for Fiji. The flash flood occurs in urban areas in Solomon, Vanuatu, and Samoa. It is required to establish an organization to plan and implement the countermeasures and to assign engineers specialized. In Fiji, floods and landslides have occur frequently. A project for basin management shall be executed as soon as possible

5) Information and Communication System

In the region, it is necessary to count on external assistance during a time of disaster. For instance, it will be more effective to perform information gathering activities by NGOs who have bases in affected areas. In order to add diversity of external institutes and normalizing service (service level improvement), it is recommended to standardize operation, materials and equipment in the Pacific.

Table 3-17 Curreant Situations and Issues: Administration and Organizations

County	Summary
Fiji	<p>Disaster risk reduction is mainstreamed. NDMO does maximum effort as the coordinating agency for disaster management. Disaster education in schools is enhanced. During the Mission's visit, Ba area suffered flood and urgent response was being performed. NDMC was established and efficient management was performed. The work is efficient although, the office is not digitalized.</p> <p>The NDMO's activities are mainly on urgent response, and activities for awareness/preparedness are needed to be enforced. Warning system is needed to be improved.</p>
Solomon	<p>DRR is mainstreamed as a national policy. NDMO is doing its best with the limited resources as a coordination agency. It is needed to continue making SOP for DRR related organizations. More rapid information transmission system is needed</p>
PNG	<p>Economic development is given higher priority. DRR has less importance in the national policy. Therefore, administration for DRR is weekend. National Disaster Center lacks manpower and budget, and does not function as it expected. No SOP exists. In order to improve this situation, DRR should be given higher priority. Capacity improvement of organizations, data collection system, increase of number of staff and capacity development of staffs in professionalism, are to be conducted. On the other hand, countermeasures for climate change adaptation are mainstreamed. It will be efficient to enforce incorporating DRR into climate change adaptation that is conducted by Office of Climate Change and Development.</p>
Vanuatu	<p>DRR is mainstreamed in policy. The action plan until 2016 has been prepared. It is needed to institute administration and organizations as stipulated in the action plan;</p> <ol style="list-style-type: none"> 1)Preparation of SOPs and manuals related with DRR 2)Instituting local administration and organization in provinces and areas 3)Promotion of awareness and preparation in communities
Tonga	<p>Acts for DRR is stipulated and administration such as NDC and NEMO is instituted. However, there is only one key person in NEMO and its capability on response or preparedness is limited. Capacity development is needs</p>
Samoa	<p>Acts for DRR is stipulated and administration such as NDC and NEMO is instituted. However, instituting local organization is not progressing as it should. In most of organizations, there is no SOP. These issues should be improved. There are only 3 staffs in NEMO. However, during disaster occurrence, NEDC is set up, NDC member are gathered and NEDC functions as the center of disaster management with NEMO as a coordinator.</p>

Table 3-18 Current Situations and Issues: Weather Observation and Forecast

County	Summary
Fiji	FMS conducts production and announce of weather forecast and warning as a Regional Specialized Meteorological Center (RSMC), Tropical Cyclone Warning Center (TCWC), and Tropical Cyclone Advisory Center for Aviation. However equipment is getting old and trouble has occurred in the observation. FMS also has a function as a training center of the region. Its use frequency is increasing in recent years and the necessity for extension and renovation has arisen.
Solomon	SMS currently has 6 manned weather observatories. By the assistance of UNDP, 4 automatic weather system and 12 rain gauges will be installed by 2012. The upper air observation is not conducted stably due to financial aspects since radiosonde for the observation is disposable and expensive. Stable and continuous upper air observation by the wind profiler whose maintenance cost is cheaper is desired.
PNG	NWS currently has 14 manned weather observatories. By the assistance of EU and World Bank, 10 automatic weather system and 20 rain-gauges will be installed by 2012. Upper air observation is not conducted at all due to financial aspects. Although NWS obtains meteorological products produced by advanced countries through internet, internet connection is very limited currently since internet connection charge is very expensive for NWS. Connecting to GTS in order to obtain weather information stably at lower cost is necessary.
Vanuatu	VMGD has 7 manned weather observatories. Although the information from the observation points of its own country is not enough, SATAID and other methods which were mastered through JICA and other training programmes are utilized effectively, VMS carry out their duty in the limited conditions. Increasing of weather observation points and improvement of weather forecast accuracy by establishment of acquisition way for meteorological data through GTS will be future issues. The cooperation to this field is necessary.
Tonga	TMS has 7 manned weather observatories. The serious problem is that only 10-20% of observation data from two islands located in northern part of Tonga (Niua Foou and Niuatoputapu) can reach head office timely. For data transmission from these islands, telephone line that is very unstable is utilized. Improvement of the quality of communication service is top priority. The 28 staffs carry out various weather operation, such as observation, forecast, and data management. The office is operated on 24-hour basis. Making the regional network which utilizes an upper air observation data is desired.
Samoa	Observation network is going to cover whole islands by the equipment supplied under Japan's grant aid SMD staff members will have a certain level of skill by technical cooperation project for 2 years starting from 2012. Moreover, Wind Profiler is supplied by this project, and the observed upper air data can be shared for the weather forecast in the region.

Table 3-19 Current Situations and Issues: Earthquake / Tsunami Observation

County	Summary
Fiji	The seismic observation network between Fiji and Tonga is built by the JICA's technical cooperation project. However, it is still difficult to analyze and judge the earthquake on tsunami occurrence by themselves due to lack of skill. In order to utilize the said network system more effectively, it's required to skill-up the technical capabilities about tsunami prediction.
Solomon	There is no self-operational observation network system for earthquake in Solomon. USGS/USA installed a seismograph. USGS conducts Maintenance of the equipment. The organization and staffs need capacity building.
PNG	15 monitoring stations are observing volcanic activities and earthquakes. However there is not a network to transmit real-time data. Therefore it is not possible to get real-time earthquake data by its own monitoring stations. Construct 10 new observation stations with real-time network system assisted by EU is progressing. After this network is constructed, it will be possible to get epicenters and intensity of earthquakes in real-time. Technical skill up for tsunami prediction by monitoring earthquake is required.
Vanuatu	Installation of seismographs and sea level gauges is prepared by Japan's grant aid project. On the other hand, VMGD has proposed to establish South Pacific Seismic Network System connecting regional countries. It is expected that the DRR on tsunami by observing earthquake in the South Pacific region will be improved by realization of this plan. Improvement of seismic observation organization in each country, and the assistance for this system establishment is needed.
Tonga	Tonga and Fiji share the earthquake data through satellite network system established by JICA project on 2007. However there is only one dedicated staff in TMS. Monitoring and equipment maintenance rely on this staff. It is difficult to conduct 24 hours operation under this staff allocation. It will be more efficient to combine seismology section with meteorology section to solve such constraint. To establish seismic network system by South Pacific countries is an ideal target. Its project cost and sustainability are realistic.
Samoa	Installation of seismographs by China's grant project will be completed in 2012. Thereby national seismic network will be established. It will contribute to the seismic analysis and the tsunami prediction of the South Pacific if the information is shared with other countries. At Upolu Island, one sea level gauge is installed through Japan's grant project, and more accurate tsunami analysis in the region can be expected.

Table 3-20 Current Situations and issues: Cyclone, Flood and Landslide

County	Summary
Fiji	Hydrological monitoring is carried out systematically and flood warning is issued. Although floods have occurred frequently in the rivers located in low lying areas in western Viti Levu, the measures against flood has not been implemented.
Solomon	There should be an organization in the law in charge of flood control, however, as a matter of fact it does not exist and countermeasures have never been implemented. Setting up the responsible organization is needed.
PNG	The actual administrative organization which is responsible for flood control does not exist. Setting up the responsible organization is needed.
Vanuatu	The flood due to poor drainage has occurred in the urban areas. Priority is given to economic categories, such as roads and ports. The infrastructure improvement for DRR has not been implemented. It is needed to integrate organizations related with flood control. Capability of river engineers has to be developed.
Tonga	In metropolitan Nuku'alofa, poor drainage causes problems in the low lands along the seashore. PUMA plans to create flood hazard maps with EU support, and prepares the land use regulation with evacuation routes and shelters. MWDRA is responsible for structural countermeasures, such as drainage canals, however, they have insufficient budgets and talented engineers. Setting up an integrated organization and capacity development of the staffs are the first priority.
Samoa	The high tide damage caused by cyclone has occurred in the lowlands along the seashore including capital Apia. In the capital, the flash flood by heavy rain has been a problem. Hydrological monitoring, implementation of flood control and land use control are conducted by different organizations. Talented staffs are lacking. Setting up an integrated organization and capacity development of staffs are needed.

Table 3-21 Current Situations and Issues: Information / Communication System

County	Summary
Fiji	Observations are spread around Suva and Nadi in Viti Levu island. They are depending on landline network which have high risk of disconnection during disaster. Human-intensive data gathering system functions at sufficient level. NDMO does not have automated information management system.
Solomon Islands	Except Honiara area, network infrastructure development is left behind. Development of HF radio network area is a major issue. Maintenance of the equipment / facilities are needed.
PNG	Cost for communication lines have increased. Governmental institutes have limited options. Service level has been degraded. It is difficult to have initiatives for developing inter-government network's service.
Vanuatu	Infrastructures development in remote islands has been left behind. There is no body of governmental institutes nor local government to collect information in a time of disaster. NDMO depends on information which is collected by NGOs. In remote islands. It is important to develop infrastructure and organize disaster response body in local government level.
Tonga	There are irrational governing structure in issuing earthquake and tsunami warning. Meteorological service unit which have 24 hours monitoring personal only monitors data. Geological service unit which doesn't have 24 hours monitoring shift holds the roll of observation and warnings. It is necessary to formulate reasonable governing structure to issue warnings while Geological Services Unit is off duty. Human resources are limited. Therefore, IT system which supports data gathering is now under construction.
Samoa	Network which connects major disaster relevant institutes are in good shape. They are connected by Fiber-optic cable network and wifi network which kept redundant. Radio broadcast network which covers whole nation is becoming decrepit. Therefore, it is recommended to renew broadcasting equipment and add redundancy.

Chapter 4 PROPOSED ASSISTANCE

4.1 Principles for Proposal

Proposed assistance was prepared based on the principles as follow.

(1) Sustainability with local resources

Scale and contents of the assistance are determined such that the sustainability be secured with local resources.

(2) Regional assistance

Regional assistance is proposed in case ①there are common issues in the region ②network over the region is needed. The former idea is applied to administration/organization improvement, and countermeasures against cyclone / flood / landslide. A project can take care of issues common over the region and the participants can share their ideas for solution of problems .The latter applies to weather observation / forecasting, earthquake / tsunami observation, and information / communication system

(3) Avoidance of duplication with other donors

Assistance is proposed on the areas that are not covered by other donors. Duplication with other donors is avoided. For this purpose, activities of donors are tabulated in the previous chapter by countries, by kinds of disasters and by countermeasures for DRR.

4.2 Proposal for Assistance

4.2.1 Administration and Organizations

(1) Proposed Assistance

In every country where mission visited, the act for DRR has been stipulated and basic action plan has been prepared. SOP is under preparation by organizations on national or local level. Under NDC, disaster committees on local level are being prepared. Some of them have been set up. NDMO is instituted as a coordinating body for disaster management. Thus, the framework of administration and organizations has been structured. However, organizations for DRR, such as NDMO, lack manpower. In communities, awareness is not well disseminated.

Information / communication system has not reached the sufficient level, and is incapable of responding to emergencies. Problems and issues are summarized as follow.

- a) Making of SOP
- b) Structuring local administration
- c) Capacity development of organizations and staffs such as NDMO
- d) Promotion of awareness in communities
- e) Enforcement of capacity for emergency response

The proposed assistance is summarized as follow. Regional approach is possible as every country has identical issues.

Table 4-1 Proposed Assistance for Administration and Organizations

Items		Outline	
Name of Assistance		Capacity development of administration and organization on DRR in the Pacific	
Targeted Countries		Fiji, Solomon, and other countries in the Pacific	
No.	Contents of Assistance	Items with Priority	Scheme
1	Making SOP and training of its use	<ul style="list-style-type: none"> • Making SOP and training of its use on national level • Making SOP on provincial/communities level and raining of its use • Making of manuals for preparing hazard risk maps 	Technical Cooperation
2	Capacity development of NDMO and DRR related agencies	<ul style="list-style-type: none"> • Availing professional knowledge as DRR organizations • Data collection, disaster assessment, and information issue • Logistics • Integrated management of flood control 	Technical Cooperation
3	Promotion of awareness(Culture of DRR activities)	<ul style="list-style-type: none"> • Promotion of awareness in schools, incorporating disaster education into curriculum, making hazard maps, evacuation exercise • Regular DRR workshops in communities 	Technical Cooperation

(2) Comments and Consideration

- a) SOP is an essential tool to organize DRR. It is important to equip administrative organizations on national, local or community level, with SOPs from practical point of view. Japan can apply various techniques to this area.
- b) It is impossible to predict the exact time of occurrence of disasters, but they shall happen. Sustaining awareness and preparedness are necessary. For this purpose, culturing DRR is proposed by incorporating disaster education into school curriculums or by holding regular workshops in communities.
- c) NDMO (or its equivalent agency) of every country is busy in managing emergency response. There is little room for awareness and preparedness. It is more realistic to promote awareness and preparedness by putting focus not only on administrative organizations, such as NDMO, but also on communities and schools.

(3) Collaboration with AusAID and NZAP

In DRR, public help is not enough, but mutual help and self-help among communities are also important. AusAID conducts community DRR, in Solomon Fiji, Vanuatu, and Samoa. Japan can also tackle to the community DRR in these or other countries to achieve dissemination of awareness and preparedness, and thus, capacity of the communities is enhanced with collaboration of both countries.

4.2.2 Weather Observation and Forecast

(1) Proposed Assistance

Since the meteorological disasters in the Pacific are mainly cyclones and the active thunderstorms by

stagnation of South Pacific convergence belt, it is important to arrange the system to conduct the upper air observation and rain fall observation for trend surveillance of tropical cyclones and South Pacific convergence belt in order to mitigate the impact of these disasters. However, from the result of the survey, it was confirmed that the upper air observations were hardly conducted in most countries other

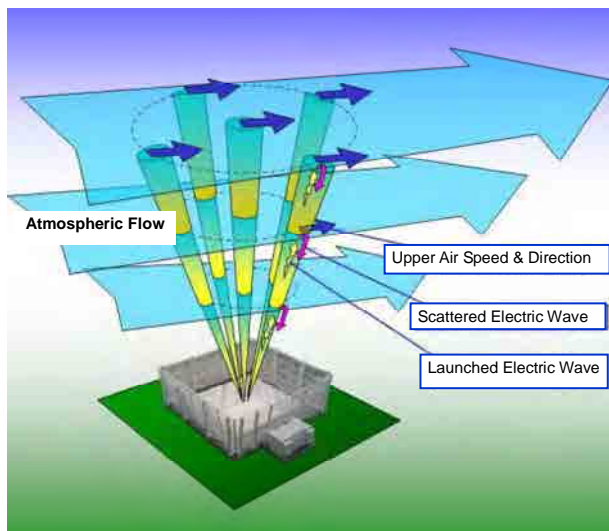


Figure 4-1 Observation Principle of the Wind Profiler

than Fiji and Samoa. Utilization of the upper air observation data will enable to make more precise weather forecasts. Regarding Samoa, the condition for the upper air observation will be developed since a wind profiler will be provided under the Japan's Grant Aid Programme for Environment and Climate Change. Although "Radiosonde" type of the upper air observation equipment was installed under the G-Force project which was conducted by WMO in 2006 at Solomon Islands, PNG, and Vanuatu, this kind of equipment have been left unused in these countries after the end of the project due to their financial reason. It requires to prepare the sensor (consumable parts: ¥20,000 -

¥30,000/pc) to be attached to a balloon and released high up in the sky every day. On the other hand, because Wind Profiler doesn't need any consumable parts, maintenance management is much easier.

Moreover, the weather phenomenon which occurs in the Pacific Region, such as cyclones, stagnation of South Pacific convergence belt, El Nino and La Nina phenomenon, may leave its mark not only on one country, but also on adjoining several countries or even on the whole earth. Therefore, it is very important for the Pacific that each country mutually cooperates for the weather observation and builds one big observation network in the whole region in order to reduce damage from disasters. However, it is confirmed that although the observed data of its own country has been provided to GTS, the system for receiving data from GTS has not been set up in most countries. This means they cannot obtain and utilize the weather data observed in neighboring countries. Obtaining observed data from neighboring countries through GTS will enable for each country to grasp the weather phenomenon around its own country more accurately and to make weather forecasts more minutely and quickly. In addition, collecting data about Climate Change is indispensable for the countermeasures against disasters caused by meteorological phenomenon.

¥30,000/pc) to be attached to a balloon and released high up in the sky every day. On the other hand, because Wind Profiler doesn't need any consumable parts, maintenance management is much easier.



Figure 4-2 Wind Profiler Provide under Technical Cooperation Project by JICA

Based on the present condition, the program focusing on the provision of the upper air observation system and formulation of the GTS system are developed in line with the following policies.

- a) To aim for the improvement of the relevant systems which can implement upper-air and rainfall observation to monitor tropical cyclones, including tropical depression, in the South Pacific convergence zone.
- b) To aim for the improvement of the relevant systems used to obtain reliable observation data as meteorological observation data needs to be transmitted to the rest of the world through a meteorological communication network and it needs to be useful for meteorological organizations and research institutions in each country to accurately understand climate change and its associated adverse effects caused and aggravated by global warming.
- c) To aim for the improvement of the relevant systems which can obtain meteorological observation data including upper-air observation in the middle area between Darwin in Australia and Tahiti which are the pivot points for the El Nino and La Nina seesaw. It is also expected that this can contribute to the prediction of the pattern of climate change.
- d) To aim for concrete contents/items of improvement that can monitor quantitatively and periodically the utilization situation of meteorological observation data as a climate change countermeasures.
- e) To aim for concrete contents/items of improvement that can quickly receive image data from a multi-purpose satellite (MTSAT) as well as from the tsunami warning issued by Japan Meteorological Agency and other meteorological products, meteorological, tsunami and seismic information/warnings of meteorological organizations found in developed countries.
- f) To aim for concrete contents/items of improvement wherein meteorological organizations can transmit meteorological, tsunami information/advisories/warning messages (SMS) to many domestic users and stakeholders in a short time.
- g) To aim for concrete contents/items of improvement that can obtain meteorological observation data that can lead to a reduction of floods and landslide disasters.
- h) To aim for the establishment of smaller meteorological equipment with less mechanical parts and a more fail-proof frequency which are more suitable for smaller meteorological organizations in the Pacific.
- i) To plan to merge the effects of the "Project for Improving the Weather Forecast System and Meteorological Warning Facilities" is conducted in Samoa in relation with the plan.

<Assumed Technical Cooperation Project>

As stated above, Technical cooperation places emphasis on the "maintenance and operation management of the equipment and maintenance of data quality for the spread of meteorological, tsunami and seismic information". There are more than 10 countries in the Pacific that Japan can help. Therefore, we are considering some ways to conduct several numbers of trainings and to merge the effects of projects simultaneously. One way is to divide the countries in the Pacific into groups.

Another is to gather trainees from every country at training facilities in the Fiji Meteorological Service/Bureau of Meteorology in Australia.

The features of this proposed assistance are described in the following table.

In addition, it is worthy of considering the following projects from a viewpoint of the contribution to the area since Fiji is a RSMC in this region and has the weather observation and forecast technology which it was most advanced in this area.

- a) The expansion of existing facilities of Fiji Weather Service for the implementation of regional training for Weather Service.
- b) Improvement of equipment calibration facilities in order to function as a Regional Equipment Calibration Center.

Table4-2 Proposed Assistance for Weather Observation and Forecast

Name of the Assistance		The Provision of Surface and Upper Air Observation for Surveillance of Meteorological Disaster and Climate Change by Global Warming in the Pacific Region, and Meteorological, Earthquake and Tsunami Information Receiving Network.	
Target Countries		Countries in the Pacific Region	
No.	Component	Priority Issue and Description of Components	Type of Assistance
1	Provision of Upper Air Observation System, GTS System and Other Relevant Systems	Provision of <ul style="list-style-type: none"> • Surface Weather Observation Equipment • Upper Air Weather Observation Equipment • VSAT Telecommunication Equipment • Sea Water Level Observation Equipment • GTS Message Switch Equipment and others 	Provision of Equipment
2	Equipment Operation and Maintenance	Production of observation instruments and data communication equipment maintenance and management manual	Technical Cooperation
		Production of observation and data communication equipment maintenance and management record book	
		Preparation of consumables & spare parts list including technical specification and detailed procurement plan	
		Practice training of countermeasures, fault finding, remedy and recovery against abnormal conditions	
		Adjustment and correction of the observation instruments	
3	Data Quality Control	Formulation of observation rules (observation order, time and duration, reporting time, etc.) and standardized beau fort and cloud level	do
		Preparation of daily observation data input sheet (Excel file)	
		Establishment of automated formula for calculating station pressure, sea level pressure, relative humidity, vapor pressure and dew-point temperature	
		Handling of the observed data which deviates from normal level (data error check and data entry)	
		Database development and management	
		Implementation of statistical processing for the climate data by Excel <ol style="list-style-type: none"> 1) Target observation element: temperature, precipitation 2) Statistical processing item: average, maximum, minimum, moving average, standard deviation, anomaly from average and moving average 	
	Data protection, storage. retrieval protection		

		<p>Analysis of statistical processing results</p> <p>1) Determining precipitation and temperature trend (clarification of ageing inclination with regression analysis)</p> <p>2) Correlation analysis between rainfall amount & frequency and temperature</p> <p>3) Monthly change of the correlation between Samoan data and another countries' data.(especially Tahiti and Darwin which are the internationally designated observation points of the southern oscillation index for monitoring El Niño event)</p> <p>4) Setting the normal value range of the observed data with histogram</p> <p>Quality evaluation of the existing climate data</p>	
4	Weather Information Dissemination	<p>Productions of newspapers, Journals and media release weather information</p> <p>Production of Television Weather and Internet products</p> <p>Production of Weather Information for Education</p> <p>Production of Weather Information Home Page in Internet and its Update</p>	do
5	Weather Forecast	<p>Short term forecast with the Wind Profiler and observed data (grid data)</p> <p>Development of Point Forecast Program (VBA in Excel)</p> <p>Production of Guidance (with observation data for short term forecast 24hrs. forecast, weekly forecast and 15days forecast)</p> <p>Development of Weekly Forecast and Extended Forecast(15days)</p> <p>Decision of the moving side with pressure change</p> <p>Acquisition of the tropical disturbances with satellite picture and Wind Profiler</p> <p>Use of SATAID software for General Forecast and tropical cyclone forecast</p> <p>Watch of the relation of Easterly wave and SPCZ</p> <p>Producing of statistical analysis of low level and upper level system</p> <p>Production of forecast briefing flowchart and forecast briefing record book</p> <p>Practical training for forecast briefing</p>	do

Table4-3 Details of Equipment Contents for Proposed Assistance

Name of Country	Equipment				
	Surface Weather Observation Equipment	Upper Air Weather Observation Equipment	VSAT Telecommunication Equipment	Sea Water Level Observation Equipment	GTS Message Switch Equipment
Fiji	15	1	1	4	-
Solomon	14	1	1	2	1
PNG	20	1	1	2	1
Vanuatu	12	1	1	2	-
Tonga	7	1	1	2	1
Samoa	-	-	1	2	-
Tuvalu	1	1	1	2	1
Kiribati	1	1	1	2	1
Micronesia	1	1	1	1	1
Nauru	1	1	1	1	1
Niue	1	1	1	1	1
Belau	1	1	1	1	1
Marshall	1	1	1	1	1

Table4-4 Feature of the Proposed Assistance in Weather Observation and Forecast

Item	Description
Project Effect Area	It becomes possible to benefit not only Pacific Region countries but the improvement of the weather forecast (numerical weather prediction) of the advanced nations in the world including Japan.
Feature	<p>Since it is not large-sized weather observation equipment and there is little failure due to very little movable part, the equipment suits the scale of many Pacific Region Meteorological Organizations.</p> <p>In conjunction with "The Project for Improvement of the Weather Forecasting System and Meteorological Warning Facilities" to carry out in Samoa now, it becomes possible to develop the effect of a project.</p> <p>It becomes possible to receive quickly the satellite imagery data of Multi-functional Transport Satellite (MTSAT) of our country, tsunami warning issued by Japan Meteorological Agency and numerical weather prediction product of an advanced nation weather organization.</p> <p>Establishment of the Pacific upper air observation network is attained, and observed data is able to be utilized not only in own country but in every country in the world.</p> <p>It is expected that the weather observation data of the Pacific region countries will contribute not only to mitigation of a disaster but to climate change prediction.</p> <p>Meteorological observation data contribute to the disaster risk reduction of a flood and land slide since flood and land slide are occurred by a cyclone and thunder storm.</p>
Maintenance	Price of Spare Parts are cheaper and replacement is more easy as compared with Large-sized weather observation equipment.
Burden matters (important) of a recipient country	Securement of High Speed Communication Line

(2) Comments and Considerations

- 1) Although upper air observation data contributes to improvement in forecast accuracy, in order to make the effect develop earlier on a higher level, the technical cooperation for the weather forecast utilizing upper air observation data is indispensable.
- 2) The electricity charge is very expensive in each country in the South Pacific. In order to decrease the maintenance cost, power supply support system by solar power generator is very effective.

(3) Possibility of cooperation with AusAID and NZAP

As a result of hearing from both organizations, it was not confirmed that either organization have any ongoing or planned assistance program in this field. Furthermore, in their web site, weather observation and forecast are not included in their priority sector. Therefore, the possibility of the cooperation with the both is not realistic. Japan proposes this assistance to supplement the missing part.

4.2.3 Earthquake and Tsunami Observation

(1) Proposed Assistance

Following table shows 4 ideas of dealing with tsunami in the South Pacific region. It is possible to carry out combining 4 ideas as follows.

Table4-5 Tsunami Early Warning Network System

No	Source of Information Sending	Receiving Method	Time lag to receive (Min.)	Type of Information		
				Epicenter / Intensity	Tsunami arrival anticipation time	Expected tsunami height
1	Pacific Tsunami Warning Center: PTWC	Emergency Managers Weather Information Network : EMWIN	10-15	○	○	
2	California Integrate Seismograph Network: CISN	Internet /Web Site	10-15	○		
3	Northwest Pacific Tsunami Advisory Center: NWPTAC/Japan	Facsimile, GTS	10-15	○	○	○
4	Own seismic observation network	Own network	2-3	○		

No. 1 to 3 in the above table are the methods of receiving the earthquake / tsunami information that is sent by monitoring agencies of a developed countries. About 1 and 2, they are installed in almost all earthquake and tsunami relevant authorities and NDMOs in the South Pacific countries since installation is easy and maintenance cost is cheap.

However, it cannot receive height of tsunami and there is difficulty in judgment for announcing tsunami warning. Considering the information on tsunami warning with height, No.3 source is recommended.

Although No.3 information should be received through GTS at meteorology observation offices, the information cannot be received in the countries since GTS has not been installed except in Fiji.

In order to send the earthquake / tsunami information observed by the relevant agency in the developed countries, it may require about 10 to 15 minutes for analysis and sending information from time of receiving. Above information is effective for the tsunami warning for the far-earthquake. In case of the near- earthquake with tsunami, the tsunami might have arrived at the shore. The countermeasures against near-earthquakes are still insufficient.

Regarding the above-mentioned situation, the earthquake and the tsunami relevant authorities of the countries in the South Pacific rely on the assistance from international donor agencies and are expanding the seismic observation network of their own country.

Through the technical cooperation of "Seismic Observation Network Project / JICA, 2011" the seismic network system over two countries of Fiji and Tonga was established, and earthquake information can be obtained earlier and more accurately even for near-earthquakes.

In order to respond near-earthquakes by accurate information on real time, it is necessary to obtain the seismic observation data in surrounding countries and to conduct earthquake analysis based on wide range observational data without time lags.

However, it is not easy to exchange real time data, since the system under operation for the network of seismic observation in each country is installed individually with different format.

Under such circumstances, VMGD (Vanuatu Meteorology and Geo-hazards Dept.) has proposed ORSNET (Ocean Regional Seismic Network for Earthquake and Tsunami Mitigation). In this network, data recorded in the unique format of each country is changed to a compatible format, which enables the countries to share the whole data.

By performing data exchange with the local data server installed in the country where reliable internet environment is available at any time such as Fiji, the analysis based on the data from sufficient number of seismographs which are widely installed in the region can be carried out in each country.

The candidate country of this network is as follow.

- Priority 1 : the country where observational data can be transmitted to the head office in real time (Fiji, Tonga, Samoa)
- Priority 2 : the country that has an actual plan for the data to be transmitted to the head office in real time (PNG, Tonga, Vanuatu)

If ORSNET is realized, pinpoint identification of the epicenter will be possible in about 2 to 3 minutes from the occurrence of an earthquake. If this network is realized assisted by Japan, it will contribute to the risk reduction of tsunami in the South Pacific greatly. At the same time, the techniques of forecasting tsunami prediction by the identification of epicenters and intensity information of earthquakes will be established.

The concept of ORSNET is shown in the following figure.

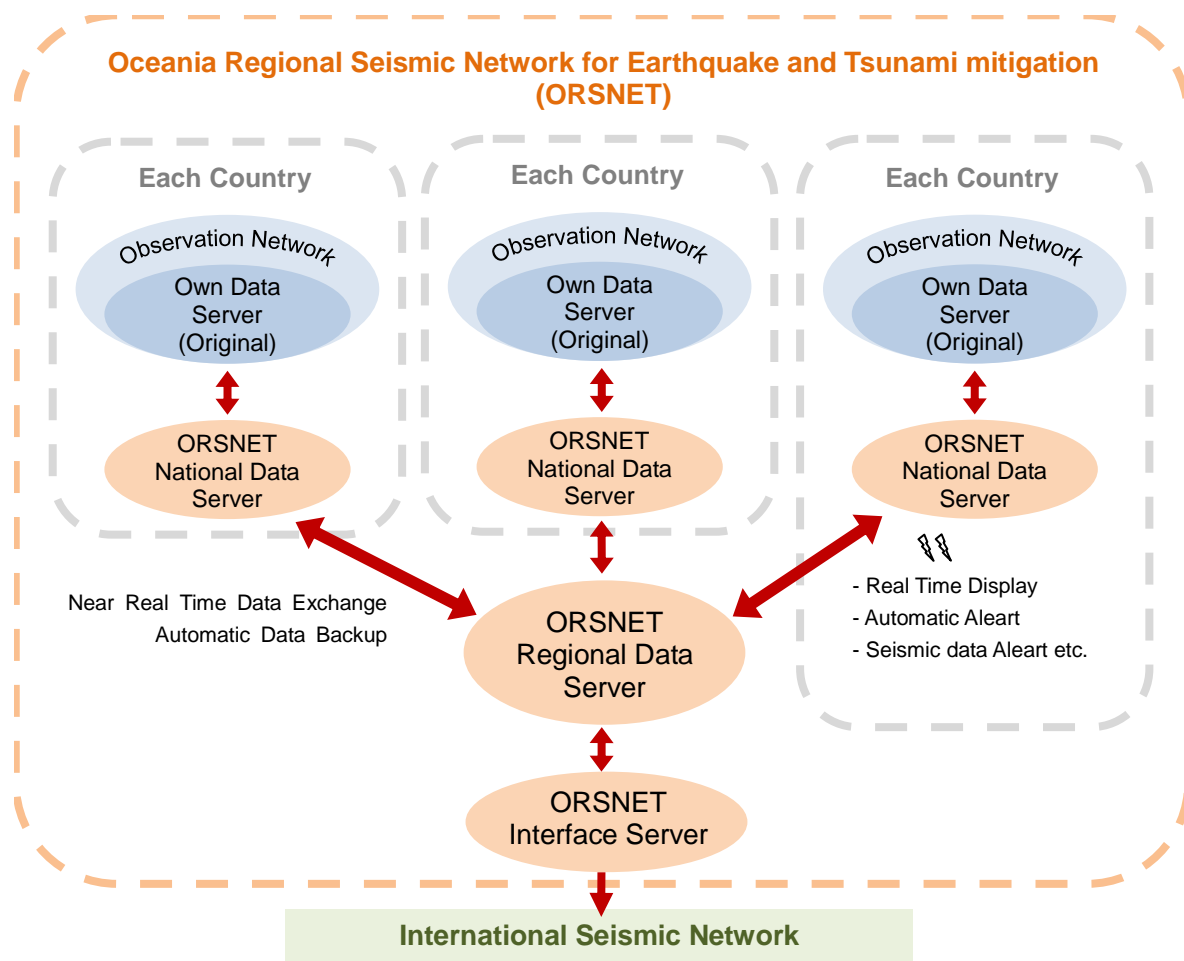


Figure 4-3 Concept of ORSNET

The outline of equipment procurement and technical cooperation for establishment of ORSNET is summarized in the table below.

Table4-6 Proposed Assistance for Earthquake / Tsunami Observation (ORSNET)

Items		Details / Remarks	
Project		Consolidation of earthquake observation system to mitigate tsunami risk in the South Pacific Region	
Candidate Country		South Pacific Countries	
No.	Project Component	Issues / Assistance Programme	Type of Assistance
1	Establishment of Network System	National data server, Regional data server, Data server for disclose to the public, GTS, Message switch and data transition equipment, Tsunami prediction system, PC for analysis of data, etc.	Provision of Equipment
2	Assistance for Operation/Maintenance of Equipment	Formulation of equipment operational manuals	Technical Cooperation
		Formulation of maintenance manuals for monitoring equipment and data transition equipment	
		Formulation of inventory/registration book for monitoring and data transition equipment	
		Formulation of technical specification and spare parts list with detail information for procurement	
		Training of technical staff for maintenance, find the cause, improvement and recovery	
	Procurement and calibration of monitoring equipment		

3	Establishment of Tsunami Forecast	Establishment of technology/methodology for identify tsunami caused by earthquake	do
		Establishment of tsunami prediction method analyzed by the information of earthquake epicenter	

Table4-7 Characteristics of Proposed Assistance (ORSNET)

Items	Details / Remarks
Characteristics	Possible to receive real-time and accurate information of near-earthquake
	Can be analyze and identify epicenters with shared neighboring countries' data when own system is stopped
	Possible to receive tsunami warning from JMA on real-time (including height of tsunami)
	It will be possible to share the observation data not only inter-regionally but world widely through data server for public discloser
Operation/Maintenance	Typical computer maintenance techniques for operation/maintenance of equipment can be applied because of using normal computer system (particular technique is not required).
	By using same system in the region, improvement in technical capabilities by a synergistic effect is expectable by technical know-how exchange in the region.
Major roll of recipient countries	Secure the high-speed data transmission
Others	World Bank has interest for establishment of ORSNET

(2) Comments and Considerations

- 1) It will be possible to responding near-tsunami after installing sufficient monitoring equipment and the improved network system recommended above. However, in order to run the system, technical skill up for proper operation is required. It will take some time to accomplish this. Therefore, it's recommended to evacuate from the tsunami to higher places for the time being. "Evacuate to the higher location when earthquake is felt!" is applicable solution at this moment. Moreover, if there is no "higher location" nearby, it is recommended to construct evacuation platforms.
- 2) As the second step, issuing urgent warning within 2 to 3 minutes for near-tsunami is needed. Establishing and participating in ORSNET is unavoidable choice for realizing the target.

(3) Possibility of Cooperation with AusAID and NZAP

1) AusAID

AusAID has no plan to propose assistance on management of earthquake/tsunami disaster. The sea level gauges have been installed at 12 places of South Pacific region through "The South Pacific Sea Level and Climate Change Monitoring Project" with the fund of AusAID. They are installed for an object for investigation of a climate change but they are used also for observation of tsunami and the high tide by a cyclone, etc. However, the number of sea level gauges installed in each country is one set for each, and the number of the gauges is not sufficient to observe the tsunami and high tide which may occur from various directions.

Cooperation with AusAID can be realized at by installing the sea level monitoring system by Japan to observe the tsunami and high tide from every direction.

2) NZAID

Pacific Islands Forum was held in September 2011. NZAID pledged the project of "Upgrade of Pacific Tsunami Risk Management Systems" for Samoa, Tonga, Niue, Tokelau and Cook Islands with

budget NZ\$2.6 mil.. The details of the project are as follows.

- a) Various programmes for analysis of near-tsunami and improvement of warning system
- b) Installation of sirens for warning
- c) Promotion of the disaster risk management, supply educational materials for natural disaster prevention, education and drill for tsunami evacuation
- d) Application of scientific data for effective evacuation route from tsunami

In Samoa, it is under process of installation of 23 disaster sirens in 2 main islands and will be completed by the end of 2012. This project has specified the 5 candidate countries. Japan will be able to conduct the identical assistance in such a way target countries do not duplicate.

There is another plan, "The Strengthening of Existing Observation Data Transition Equipment of Volcanic Activity" for Vanuatu. This plan enables to utilize observational data not only for volcanic activity but for observation of a near-earthquake by transmitting the data of the existing seismographs to the head office in real time. Since this plan is closely related with the grant aid project by Japan under process to dispatch a mission, careful coordination is needed.

4.2.4 Cyclone, Flood and Landslide

(1) Proposed Assistance

There are floods in the low lying areas on western part of Viti Levu in Fiji, flash floods on urban areas in PNG, Solomon, Vanuatu and Samoa, and a poor drainage system in the metropolitan in Tonga. In these areas, problems by floods and poor drainage systems will become still more serious with impacts of population increase and urbanization.

The following items are common in these countries.

- a) Hydrological monitoring is done for water resources development and hydro-power generation, but not for the countermeasures against floods.
- b) The countermeasures for raising the flow capacity, such as bank construction and river bed excavation are not implemented.
- c) Organizations responsible for hydrological monitoring, land use plan and measures for flood are different. Talented staffs also run short. The integrated organizations and personnel training the measures are to be realized at first.
- d) There are no engineers who plan river improvement and flood prevention.
- e) The priority of the measures against flood at the national level is low.
- f) Since the capacity of the government organization is insufficient, it is also necessary to strengthen the capability of communities.

In order to implement measures for flood and landslide, it is necessary to improve items mentioned above. It is efficient to support the common subjects of the countries as a regional cooperation.

Following points are shown for the regional issues.

- 1) Integration of government organizations related with flood management.
-

- 2) Education and employment of engineers on flood management engineering, river engineering, and sediment control.
- 3) Support for formulation of flood management plan, sediment control plan and integrated water resources management (IWRM) plan.
- 4) The funds and technical cooperation both for non-structural measures such as flood forecasting / warning system & preparation of hazard maps and for structural measures such as embankment, river bed excavation & construction of drainage canal.

As mentioned above, the proposed assistance is shown below.

Table4-8 Proposed Assistance for Cyclone, Flood and Landslide

Item		Description/ Outline	
Proposed Assistance		Capacity Development for Countermeasures against Cyclone, Flood and Landslide	
Target Countries		The Pacific countries	
No.	Components	Priority Issues and Description of Components	Type of Assistance
1	Engineer Training for Floods, Sediment Management including the Foundation of the Disaster Prevention Section	Training for arrangement and analysis on disasters	Technical Cooperation
		Training on measures for disasters	
		Education program (Disaster prevention, hydraulics, hydrology, river engineering, soil mechanics, flood management, land use, run-off regulation for urbanization)	
		Rehabilitation works	
		Flood management, sediment control	
		River engineering (Structural measures, Non-structural measures)	
		Cost estimate for river engineering	
2	Integrated Water Resources Management (IWRM), Integrated Flood Management (IFM)	Flood management plan (Flood control plan, Run-off analysis)	Master plan/Feasibility Study
		Water resources development plan (Water resource potential, Drought)	
3	Capacity Building, Foundation of New Organization	Foundation of flood protection section and river planning training section	do
		New legal system (River law, Water resources development law, Sediment control law)	
		Foundation of local division	
		Employment of civil engineers and capacity building	
4	Non-structural measures	Preparation of hazard maps	Technical Cooperation and Provision of Equipment
		Equipment provision , Hydraulic simulation	
5	Community based Disaster Prevention	Education	Technical Cooperation
		Awareness of hazards	
		Simple monitoring and warning system	
		Evacuation	

(2) Comments and Considerations

- 1) In Fiji, for the Nandi River and Ba River where flood damage and sediment discharge damage occur frequently, the integrated measures against basin management including flood prevention plan (structural and non-structural measures) and sediment management are important, It is necessary to update the results of an existing master plan and feasibility study for the purpose of implementation of the projects. JICA conducted “Watershed management and flood control for the major rivers on Viti Levu” on 1996-1998. World Bank is planning to conduct “Flood risk assessment and Identification of mitigation measures” on 2012.
- 2) In Salomon, it is the situation that engineers for the rivers and flood control in do not exist in the related government organizations, and instituting an organization to take actions for flood is required. Therefore, it is important to carry out the monitoring for rainfall & a river water level, education for disaster prevention, and awareness of hazards. It is effective to expand the activity in the Umasani River and Tanboko Village to other rivers and other areas, to raise the disaster prevention capability in communities.
- 3) In PNG, it in the situation that the priority of the measures against flood is still low. Talented engineers are unevenly distributed to energy sectors, such as LMG sector in PNG, and shortage of the staffs and young engineers is a problem in WRB. Improvement of organization including the telemetry system from the view point of labor-saving on monitoring for rainfall and water level is needed.
- 4) Taking into account the current situations, on the basis of the long term vision for the target year of 2030, it is required to launch the river hydrology section, and to draw up the river plan for disaster prevention, water supply plan, and water resources development plan including hydropower generation.
- 5) As for flash flood in the city in Vanuatu and Samoa, and issues on poor drainage in Tonga, it is required to conduct hydrological study, drainage canal survey, and study on measures taking into account the urbanization.
- 6) Although the problems of flood have unique features at each country and corresponding measures are needed, there are problems that capacity of organizations and engineers are insufficient in common. Strengthening the capacity is needed, and regional -based cooperation is possible.

(3) Possibility of Cooperation with AusAID and NZAP

As for cooperation in the disaster prevention field with Australia and New Zealand, both countries emphasize the urgent response, rehabilitation and community based DRR. Japan also carries out the community based DRR. Therefore, careful coordination is needed.

4.2.5 Information and Communication System

(1) Proposed Assistance

Currently development of information / Communication System consists of following components.

- a) Set up of NDMO as the permanent coordinating organization for development and maintenance of information system and communication infrastructure
- b) DRR education for communities as a starting point, through training, making local government and villages as local assets for information gathering
- c) Development of rapid warning system using radio broadcast network, SMS, and siren system

Countries that the survey them visited recognize importance of information gathering and delivery system. In addition, above mentioned b) has been implemented in many countries. Participating institutes have cooperated in area coverage. Currently they have cooperated in standardization of training contents to improve service level. On the other hand, a) and c) have less progress for following reasons.

- 1) Governmental institutes do not have human resources who have ability to direct development of emergency response information system.
- 2) It is difficult to allocate budget for operators who maintain and operate emergency response information system in full time.
- 3) Private companies which maintain communication lines and equipment do not exist. Infrastructures are not in place either.

In Tonga, Ministry of Information and Communication (MIC) is starting to implement prototype communication liaison system on cloud* which cooperate with siren system. This system is going to reduce workload of information gathering and speed up process of express warning by workflow automation. System's characteristics and points are described in below figure.

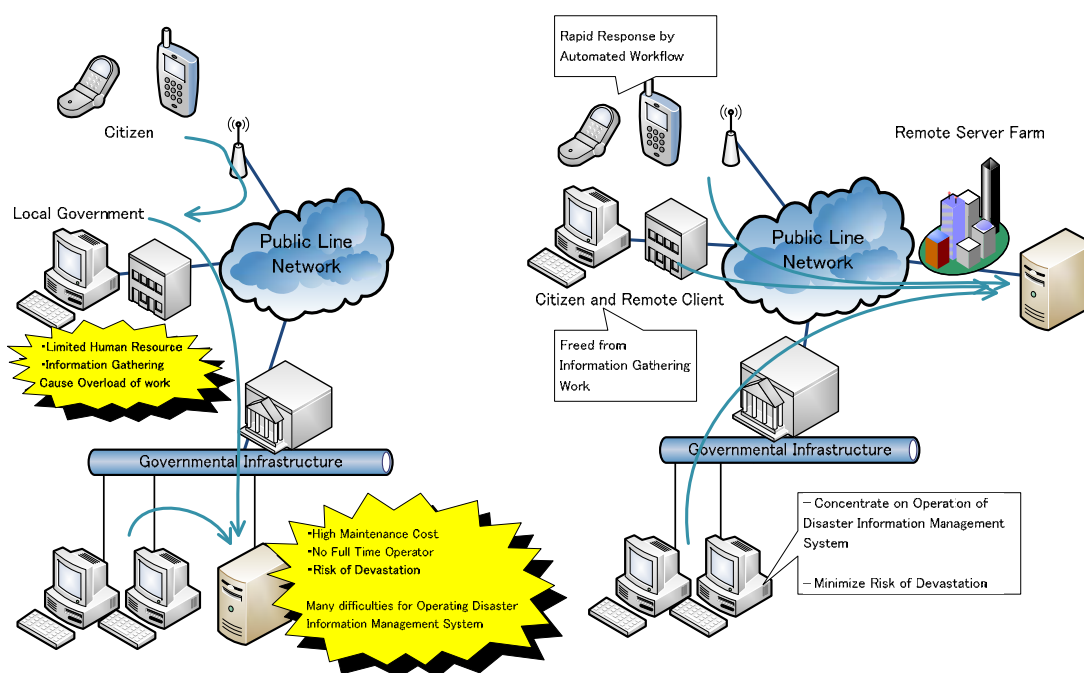


Figure 4-4 Information Gathering System Implemented on Cloud (in Tonga)

- Services are placed on Cloud. Therefore, hardware maintenance is needed no longer. It will reduce risk of devastation. It will allow human resources to concentrate on operation
- Reports will consolidate to NDMO. It will reduce workload of local government.
- By automating workflow, response for the community inhabitants will speed up

※Cloud (Cloud Computing): The term "cloud" is used as a metaphor for the Internet. It depicts an abstraction of the underlying infrastructure. End-users no longer have need for hardware, software nor expertise to utilize services. The technology infrastructure is “in the cloud”. End user only uses services on “Cloud” and charges are according to usage. It will reduce cost of ownership and avoid obsolete assets.

If the Information gathering and delivery services are placed on cloud, it can easily be utilized by other South Pacific region countries as long as they have internet access environment. With its’ training materials, it can contribute to improve information sharing in the Pacific.

Table 4-9 Proposed Assistance for Information / Communication System

Field		Contents and Summary	
Name of Assistance		Emergency Information Gathering and Delivery System Development and Capacity Building for Operation and Maintenance	
Target countries		Fiji, Vanuatu, Tonga, Solomon Islands*, PNG*	
No.	Components	Priority Issue and Description of Components	Type of Assistance
1	Emergency Information Gathering and Delivery System Development	Development of cloud information gathering and delivery system	Technical Cooperation
		Capacity building of director for emergency information system	
		Information gathering and delivery system operation training	
		Preparation of training kit for community inhabitants	
		VHF Radio Network and Siren System Development	
2	Communication System Advisor	Preparation of emergency information system development plan for NDMO	Expert
		Preparation of SOP for system operation, Preparation of maintenance frame work for network environment (draft of MOU between relative institutes)	
		Preparation of scenario for drills and coordination of drill	
		Preparation of education KIT and standardization of existing contents	
3	Information / Communication System Training Program	Utilization of IT equipment and database maintenance training	Training
		Training for trainer to organize community inhabitants with disaster education KIT	

* In Solomon Islands and PNG, infrastructures in local regions are under very poor condition. It is difficult to apply the same type of assistance for them. Therefore, when implementation of the system become mature and the system is applied to remote islands, assistance may be realized.

In addition, as difference of each country’s communication circumstances exists, it may be required to add options as follow.

- a) For setting up temporally communication base at remote islands, satellite network KIT will be added.

b) Radio broadcasting system will be chosen instead of siren system

(2) Comments and Consideration

- 1) In major countries in the Pacific such as Tonga, Vanuatu, Samoa and Fiji, cellphone network service become very popular. It is assumed that community inhabitants’ abilities to transmit and receive information are potentially becoming higher. In Samoa, by cooperating with cellphone network services, emergency information management system has been implemented. It increases efficiency of data gathering and information delivery process. This system mediates information distribution between NDMO and community inhabitants. It made local government and other intermediate institutes free from heavy workload. It also makes emergency response more rapid.
- 2) Development of emergency information management system and capacity building for promoting this Samoa modeled system may generate a broader benefit from information and communication system in the Pacific. By developing services on “Cloud”, it minimizes needs for equipment and human resources. In general, it will allow even less human resourced country to operate. It may generate much benefit compared with conventional system.
- 3) On the other hand, this emergency information management system relay on communication infrastructures. In the country which has difficulties in communication infrastructure development such as PNG, it is assessed that implementing such system is very difficult. On such countries, it is better to watch the moves of other donors that have strong relationship with the region such as Australia, before offering assistance from Japan.

(3) Possibility of Cooperation with AusAID and NZAP

Australia and New Zealand are emphasizing capacity development on community DRR through NGO. During preparation of training Kit, it is possible to share common contents among the communities.

4.2.6 Implementation Plan of the Proposed Assistance

Implementation plan of proposed assistance mentioned so far is tabulated below. The items with bold letters are indicated as short listed, with priority.

Table4-10 Implementation Plan of the Proposed Assistance

Administration and Organizations							
Name of Assistance	Capacity development of administration and organizations related to disaster risk reduction in the Pacific						
Central Issues	1)Promotion of preparing SOP 2)Promotion of set up of organizations on local level 3)Capacity development of DRR organizations , such as NDMO, and staves 4)Promotion of awareness in the communities						
Project Name	Scheme	Implementation Period (2013-2017,18-)					Target Countries
		13	14	15	16	17	

Promotion of preparing SOP/ Capacity development of organizations on local level	Technical cooperation		○	○	○	○		The Pacific countries
Capacity development of NDMO	Dispatching experts Training in Japan		○	○	○	○		do
Promotion of awareness in communities	Dispatching experts Training in Japan	○	○					do
	Technical cooperation		○	○	○	○	○	do
Weather Observation and Forecast								
The Improvement of the Surveillance Capability of Meteorological Disaster and Climate Change by Global Warming in the Pacific Region, and Strengthening of the Receiving Capability of Weather, Earthquake, and Tsunami Information.	Name of Assistance							
	The Provision of Surface and Upper Air Observation for Surveillance of Meteorological Disaster and Climate Change by Global Warming in the Pacific Region, and Meteorological, Earthquake and Tsunami Information Receiving Network.							
	Outline	Type of Assistance	Implementation Period(2013-2017,18-)					Target Countries
			13	14	15	16	17	18 ~
	Provision of • Surface Weather Observation Equipment • Upper Air Weather Observation Equipment • VSAT Telecommunic ation Equipment • Sea Water Level Observation Equipment • GTS Message Switch Equipment	Provision of Equipment (Grant Aid)	○	○	○	○		
	• Equipment Operation and Maintenance • Data Quality Control • Dissemination of Weather Information • Weather Forecast	Technical Cooperation			○	○	○	○
	Training on Weather and Climatology	Training					○	
Earthquake and Tsunami Observation								
Name of Assistance	Consolidation of earthquake observation system to mitigate tsunami risk in the South Pacific Region							
Central Issues	1)Set up the facilities to enable emergency response for near-earthquake by earning real time and accurate information 2)Assist the construction of ORSNET (Ocean Regional Seismic Network for Earth) , which enables receive earthquake observation data at real time and conduct seismologic							

analysis based on information gathered from broad areas.								
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Establishment of Tsunami Observation and Forecasting Network	Provision of Equipment		○	○	○	○	○	Fiji, Solomon, PNG, Vanuatu, Tonga, Samoa
Maintenance and Management for Equipment	Technical Cooperation			○	○	○	○	do
CB for Tsunami Forecasting	Technical Cooperation			○	○	○	○	do
Cyclone, Flood and Landslide								
Name of Assistance	Capacity building for countermeasures against cyclones, floods and landslides							
Central Issues	1)Education and training of engineers for flood control, river / sabo engineering 2)Making planning for flood / sediment control, and integrated water resources management 3)Integration of government organizations responsible for flood control 4)Non-structural countermeasures 5)Empowering the DRR capacity in communities							
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Increase of River Management Engineer	Expert & Training	○	○	○	○	○	○	Fiji, Solomon, PNG, Tonga, Samoa
IWRM	Master Plan/ Feasibility Study	○	○					Nadi River in Fiji Coastal zone of Nuku'alofa in Tonga
Integration & Strengthening of government Organization	Expert & Training	○	○	○	○	○		Fiji, Solomon, PNG, Vanuatu, Tonga, Samoa
Non-structural Measures	Expert & Training	○	○	○				Fiji
CB for Community Based Disaster Management	Technical Cooperation	○	○	○	○	○	○	Fiji, Solomon
Information and Communication System								
Name of Assistance	Development of emergency information gathering / delivery system and capacity building for operation and maintenance							
Central Issues	System that enables efficient gathering and prompt delivery of information by synchronizing information gathering / delivery system and siren warning is constructed.							
Project Name	Scheme	Implementation Period(2013-2017,18-)						Target Countries
		13	14	15	16	17	18 ~	
Development of Information management System	Technical Cooperation		○	○	○	○	○	Fiji, Solomon Islands, PNG, Vanuatu, Tonga, Samoa
Same as above	Training in Japan	○	○	○	○	○		do
Overall Management of Information Gathering and Delivery System	Dispatching experts	○	○	○	○	○		do

4.3 Conclusion and Recommendation

Capacity development in administration is needed to enforce government organizations, by preparing SOP, for an example. Making of an earthquake observation network and an upper air

observation system are proposed assistance with priority. Regarding flood control, implementation of the project around Nadi area has high priority. In parallel, capacity development in communities to enhance awareness on mutual help/self help is needed. Expanding identical activities with the project being conducted in Fiji and Solomon by JICA at present to other sites and countries, will be effective. Making collaboration network in the Region is important, since resources of each country is limited both in budget and manpower. In studying details of each project, the scale and contents should be determined so that sustainability is secured with local resources. Conclusion and recommendation is summarized below.

1) Administration and Organizations

In each country, the act and action plan have been prepared. Organizations, such as NDC and NDMO are instituted. However, making of SOP, construction of organizations on local level, and promotion of capacity in communities are needed. Capacity development of NDMO, coordination body of disaster management, is an important issue. It is effective to apply the knowledge/technology of Japan endorsed by past experiences (preparedness for disasters beyond design scale, for example) to these issues.

2) Weather observation and Forecast

Since the upper air observation is rarely conducted in the South Pacific, the region is a blank zone of the upper air observation. When an upper air observation is conducted in the region, by sharing the data among the world, the information contributes to improvement in the weather forecast accuracy of each country. At the same time, the accuracy of the weather product which advanced nations create improves, and it is fed back to the region again. For this purpose, installation of the wind profiler for performing an upper air observation and the connection with GTS for data sharing are indispensable.

3) Earthquake and Tsunami Observation

Every country can receive seismic data from PTWC and CISN, which enables the countries prepare for tsunami caused by far-earthquakes. However most of countries have no solution for monitoring tsunami caused by near-earthquakes. It is needed to establish monitoring system for near-tsunami.

4) Cyclone, Flood and Landslide

The damages caused by flood and landslide in Fiji are large. The benefits yielded by the project implementation will be high. The priority of the project implementation for flood control in this country is high. The effects of on-going technical cooperation of JICA for capacity development in communities are appearing gradually in Fiji and Salomon. Identical projects shall be executed in other sites of the countries or in other countries of the Pacific. As for the capital and its neighbor areas of the countries where urbanization is progressing, the identification on present situation of urbanization,

land use condition, and city drainage system will be required. Japan has the advanced technology on flood analysis, comprehensive flood control measures on urban areas, and the integrated water resources management. Such knowledge can be applied to solve the problems in the Pacific.

5) Information and Communication System

Emergency information management system in each country is mainly targeted at tropical cyclones. In most of the cases, it is manually-operated and it has not been sufficient systems. Fortunately in each country, cellphone network service is becoming very popular. With cellphone devices, community inhabitants' ability is potentially becoming higher. Introducing emergency information system cooperated with cellphone network services may increase efficiency of NDMO. It will mediate information gathering and delivery between NDMO and community inhabitants and reduce workload of intermediating organizations. Automated workflow may speed up process of information delivery. For now, in order to add efficiency on DRR, it is very important to manage information with leading-edge technology and knowledge of service development. Technologies which Japan has on this aspects will contribute to these countries.

Appendices

Appendix 1

Inventory on Disaster Management in Fiji

Disaster Management in Fiji (Synopsis)

Current Situation and																																						
1. Features of Disasters	<ul style="list-style-type: none"> Fiji is located in the tropical climate zone and this brings heavy rainfall, and is pummeled by cyclones and other destructive storms during the November–April rainy season. Flood damage occurs about once a year. 50 or more human lives were lost in each of three recorded natural disasters from 1900 to 2012. The northeastern portion of Fiji, which includes Rabi and Taveuni is the most seismically active portion of the country, experiencing an earthquake over M.6 that occurs once about every 3 years. Five people were lost in a tsunami caused by the 1953 Suva earthquake (M 6.8), and though attacks by tsunamis caused by remote seismic activity are rare, records of such events do exist. 																																					
2. Administrative Division	<ul style="list-style-type: none"> Fiji is composed of around 330 islands, and supports a population of around 0.85 million (a 2009 estimate). Fiji consists of the following four divisions, which are Central Division (Suva), Northern Division (Labasa), Eastern Division (Levuka) and Western Division (Lautoka) These divisions are divided into 14 provinces. Provinces are divided into districts and villages, each having its own chief and council. 																																					
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> The primary disasters risk in Fiji are cyclones and floods. A map of the route taken by the Suva tsunami (caused by the 1953 Suva earthquake) has been made, and the Pacific Disaster Center has reproduced this event using a simulation on the current coastal topography and has estimated the amount of damage that would be caused to existing buildings in the coastal area. A hazard map for the Taveuni volcano (1999) was prepared, and workshops are held for Fijian citizens as well as the national government. 																																					
• Identification of Disaster Risks (HFA2)																																						
• Sharing Information on Disaster Risks with Community (HFA2)	<ul style="list-style-type: none"> JICA is implementing the community disaster damage prevention project in cooperation with SOPAC and NDMO. The US and the UNDP kicked off and led disaster damage control efforts in the Pacific Region during the early 1990s, pushing the establishment of a National Disaster Control Center and similar organizations. The National Disaster Risk Management Plan was formulated in 1995. The National Disaster Management Act (NDMA) was enacted in 1998 and organizations from the national level to the local level were founded. NDMA was revised and updated in 2006. 																																					
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	<p>Improvement of Legal Systems:</p> <ul style="list-style-type: none"> National Disaster Management Act 1998 (NDMA) Fiji formulated the National Disaster Risk Management Improvement Plan in 2005. <p>Formulation of the Plan:</p> <p><Central Government Level></p> <p><National Disaster Risk Management Plan></p> <ul style="list-style-type: none"> The National Disaster Risk Management Plan was formulated in 1995. The National Disaster Management Act (NDMA) was enacted in 1998 The NDMA was revised and updated in 2006. The SOP concerning cyclones, tsunamis, and floods was prepared in 2011. 	<p>【Issues】</p> <ul style="list-style-type: none"> Disaster Council has been founded in each province and consists of local committee members. However, this council mainly deals with items to be conducted after the disaster and makes insufficient preventive efforts. 																																				
• Establishment and Enhancement of Disaster Management System (HFA1)	<p>Organizational System</p> <p><Institutions for Coordination among Organizations></p> <p><u>National Disaster Management Office (NDMO)</u></p> <ul style="list-style-type: none"> The NDMO is the implementing body for disaster damage management and is under the control of the Ministry of Land and Development. This office carries out specific activities for disaster damage management in Fiji. <p><u>National Emergency Management Center (NEMC)</u></p> <p>The NEMC is formed when a disaster requires a national-level response. It is primarily run by the NDMO.</p> <p><u>Fiji Meteorological Service (FMS)</u></p> <ul style="list-style-type: none"> The FMS is designated as Regional Specialized Meteorological Center(RSMC) and as a Tropical Cyclone Warning Center (TCWC) for providing information on cyclones of the World Meteorological Organization (WMO). <p><u>Mineral Resources Department (MRD)</u></p> <ul style="list-style-type: none"> The Seismology Section of the MRD receives information from the Pacific Tsunami Warning Center (PTWC) in Hawaii and predicts whether a tsunami is likely to strike. If an official tsunami warning must be issued, the Earthquake Section informs the NDMO of the issuance. <p><u>Hydrological Section, Fiji Water Authority</u></p> <ul style="list-style-type: none"> This is an organization conducting hydrological observation. This observes the rainfall and the water levels of rivers and manages them as well as provides the Meteorological Service and NDMO with such data. <p><u>National Fire Authority</u></p> <ul style="list-style-type: none"> The Fire Authority of Fiji was established under the Fire Service Act of 1994. It has 44 stations throughout the country, and coordinates rescue operations with related organizations during floods. 	<ul style="list-style-type: none"> The NDMO is insufficiently staffed given the volume and scope of the duties it performs. The Emergency Coordination Planning Unit, which plays the central role when a disaster occurs, does not operate around the clock. The number of staff in charge of the earthquake section of MRD is only one, and epicenter determination is made by manual operation. MRD does not operate for 24 hours. Information from PTWC goes into the person's in charge cellular phone directly. 																																				
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)	<p><Structural Measures></p> <ul style="list-style-type: none"> There are no river embankments, seawalls, or other flood-control structures for rivers in Fiji, and there are just a few instances of partial riverbed excavations. <p><Regulations></p> <ul style="list-style-type: none"> Fiji building standards include earthquake codes (1983) which must be followed at the time of construction. 	<ul style="list-style-type: none"> The standard is applied only to the development projects in the urban area and the administration does not engage so often in such projects in rural areas. 																																				
• Development of Warning System and Evacuation System (HFA 2, 3)	<p><Disaster Prevention Awareness Promotion Activities, Disaster Prevention Education, Disaster Drills></p> <ul style="list-style-type: none"> Tsunami awareness promotion activities are carried out by the Mineral Resources Department (MRD) for elementary school students and the local communities. Tsunami awareness promotion kit is prepared. <p><Meteorological/Communication Systems></p> <ul style="list-style-type: none"> Currently NDMO collects all information for forecasting and warning, determines the need for them to be notified of to the local residents, and notifies the forecast or the warning through the media, local governments, etc., when necessary. <p><Cyclones and floods></p> <ul style="list-style-type: none"> Rewa River: An early warning system was introduced with the help of NZAP (1986). <p><Tsunamis and Earthquakes ></p> <ul style="list-style-type: none"> The Seismology Section of the MRD analyzes the information on earthquakes and tsunamis obtained from the Pacific Tsunami Warning Center (PTWC) and issues a warning based on the analysis. 																																					
• Financial Preparation (HFA1)	<ul style="list-style-type: none"> The National Relief Fund is a fund that is usable when a disaster occurs. There is an appeal to the national government to set up a Contingency Fund as part of NDMP. 	<ul style="list-style-type: none"> When a disaster strikes, the local residents of Fiji tend to bypass their provincial disaster management office and contact the national agencies directly. 																																				
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> The National Disaster Management Council formulated the Cyclone Support Plan, which is tied to the National Disaster Risk Management Plan, in 1997. Cyclone warning procedures are also created annually. 																																					
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> UNDP has formulated plans against floods to be used as disaster management plans by local governments. Community disaster management education and awareness activities are being carried out for young people by making them part of community activities 	<ul style="list-style-type: none"> The community-based disaster management plans lack substance and need to be fleshed out with further details. No budget has been secured for the community-based disaster management education and awareness activities. 																																				
6. Climate Change Adaptation	<ul style="list-style-type: none"> Fiji and the other island nations of the Oceania are some of the most vulnerable parts of the world to the effects of climate change. Floods, cyclones, high tides, and droughts are expected to become more frequent and severer. The following table shows several World Bank indicators for the climate changes and natural disasters. <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Indicators for Climate Changes and Natural Disasters *2</caption> <thead> <tr> <th rowspan="2">Death Toll</th> <th>Droughts</th> <th>(persons/year)^{a)}</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Floods and Storms</td> <td>(persons/year)^{a)}</td> <td>8</td> </tr> <tr> <th rowspan="3">People Damaged</th> <td>Droughts</td> <td>(1,000 persons/year)^{a)}</td> <td>8</td> </tr> <tr> <td>Floods and Storms</td> <td>(1,000 persons/year)^{a)}</td> <td>26</td> </tr> <tr> <td>Percentage to Whole Population</td> <td>(%)^{a)}</td> <td>4.8</td> </tr> <tr> <th rowspan="3">Economic Losses</th> <td>Droughts</td> <td>(1,000 US\$)^{a)}</td> <td>789</td> </tr> <tr> <td>Floods and Destructive Storms</td> <td>(1,000 US\$)^{a)}</td> <td>18,078</td> </tr> <tr> <td>Percentage to GDP</td> <td>(%)^{b)}</td> <td>17.1</td> </tr> <tr> <td>Coast Line</td> <td>(km)^{c)}</td> <td>1,129</td> </tr> <tr> <td>Population living in Lowland Coastal Areas</td> <td>(%)^{d)}</td> <td>17.6</td> </tr> <tr> <td>Area of the Lowland Coastal Areas</td> <td>(%)^{d)}</td> <td>10.6</td> </tr> </tbody> </table> <p>a) Average values between 1971 and 2008; b) Average values between 1961 and 2008; c) Values in 2008; d) Values in 2000</p>	Death Toll	Droughts	(persons/year) ^{a)}	0	Floods and Storms	(persons/year) ^{a)}	8	People Damaged	Droughts	(1,000 persons/year) ^{a)}	8	Floods and Storms	(1,000 persons/year) ^{a)}	26	Percentage to Whole Population	(%) ^{a)}	4.8	Economic Losses	Droughts	(1,000 US\$) ^{a)}	789	Floods and Destructive Storms	(1,000 US\$) ^{a)}	18,078	Percentage to GDP	(%) ^{b)}	17.1	Coast Line	(km) ^{c)}	1,129	Population living in Lowland Coastal Areas	(%) ^{d)}	17.6	Area of the Lowland Coastal Areas	(%) ^{d)}	10.6	
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7. Records of Major Assistance by JICA	<p><Technical cooperation project> Operation on earthquake monitoring network (2007-2011), Capacity building for weather forecasting and networking formulation (2007-2011)</p> <p><Country-and issue based training ></p> <p>Weather forecasting and warning and disaster prevention by cyclone (2001-2005) Strengthen capacity building on weather forecasting and networking formulation (2007-2010)</p> <p><Grant aid > Development plan for weather observation and forecasting equipment (1995-1996).</p> <p>Follow-up: Providing meteorological forecasting and observation equipment and maintenance instructions (2004)</p>																																					

<p>8.Assistance Strategies and Records of Other Development Partners</p>	<p>Firefighting and fire rescue skills training course (2003-2008)</p> <p><u>Australia</u></p> <ul style="list-style-type: none"> • AusAID is supporting in various forms such as the region-wide support through SOPAC, etc., bilateral assistance, and implementation of projects through NGOs. <p><u>New Zealand</u></p> <ul style="list-style-type: none"> • NZAP is recently enhancing its cooperation for the Melanesia. Its cooperation is region-wide cooperation and is often through SOPAC, USP, and Secretariat of the Pacific Community (SPC). <p><u>UNDP</u></p> <ul style="list-style-type: none"> • NDP Pacific Regional Office operates in a 20-staff-member system implementing development aid projects and cooperation programs for 15 countries. <p><u>UNOCHA: United Nations Office for the Coordination of Humanitarian Affairs</u></p> <ul style="list-style-type: none"> • The UN Office for the Coordination of Humanitarian Affairs (UNOCHA) dispatches emergency management teams which conduct the information provision and coordination necessary for the emergency management for disasters, for governmental agencies, the donors, NGOs, etc., receiving the requests by the governmental agencies. <p><u>Red Cross International</u></p> <ul style="list-style-type: none"> • Red Cross Fiji has 25 staff members and conducts emergency life-saving activities for earthquakes.
<p>9.International Networking</p>	<p><Framework for the Measures against Disasters in Oceania Region></p> <ul style="list-style-type: none"> • The ETIC: International Tsunami Information Centre was founded under the Intergovernmental Oceanographic Commission (IOC) which is affiliated with UNESCO in 1965. <p><SOPAC: South Pacific Applied Geo-science Commission></p> <ul style="list-style-type: none"> • SOPAC is a regional framework which was established in 1982 as an independent organization under the Economic and Social Division of the UN. <p><University of the South Pacific: USP></p> <ul style="list-style-type: none"> • This university started the Disaster Risk Management Course in its graduate school in 2011 and, thereby, functions as a disaster damage prevention research institute for the member countries (the course is jointly operated by 12 countries in the Pacific).

Disaster Management in Fiji

Current Situation and Challenges	1. Features of Disasters	<ul style="list-style-type: none"> Fiji is located in the tropical climate zone and this brings heavy rainfall, and is pummeled by cyclones and other destructive storms during the November–April rainy season. Flood damage occurs about once a year. *5 Fiji is struck by destructive storms (cyclones), floods, earthquakes, tsunamis, and droughts as disasters. According to EM-DAT, 50 or more human lives were lost in each of three recorded natural disasters from 1900 to 2012, and 0.1 million or more people were suffered from each of six natural disasters from 1900 to 2012. *1 Disasters each Took 50 or More Human Lives of Natural Disasters Occurring from 1900 to 2012 <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death Toll</th> </tr> </thead> <tbody> <tr> <td>Destructive Storm</td> <td>Feb. 16, 1931</td> <td>200</td> </tr> <tr> <td>Destructive Storm</td> <td>Dec. 9, 1973</td> <td>59</td> </tr> <tr> <td>Destructive Storm</td> <td>May 27, 1979</td> <td>53</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Natural Disasters Occurring in 1900 to 2012 Each Damaging 0.1 Million or More People <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>People Damaged</th> </tr> </thead> <tbody> <tr> <td>Drought</td> <td>Jan. 1998</td> <td>263,455</td> </tr> <tr> <td>Flood</td> <td>April 12, 1986</td> <td>215,000</td> </tr> <tr> <td>Destructive Storm</td> <td>March 1, 1983</td> <td>200,014</td> </tr> <tr> <td>Destructive Storm</td> <td>Jan. 2, 1993</td> <td>160,000</td> </tr> <tr> <td>Destructive Storm</td> <td>Oct. 24, 1972</td> <td>120,000</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The northeastern portion of Fiji, which includes Rabi and Taveuni is the most seismically active portion of the country, experiencing an earthquake (M 6.9) in 1919, that (M 6.2) in 1932, and that (M 6.9) in 1979. Each of these earthquakes caused landslides and damage to buildings. *5 Five people were lost in a tsunami caused by the 1953 Suva earthquake (M 6.8), and though attacks by tsunamis caused by remote seismic activity are rare, records of such events do exist. *5 	Disaster	Date	Death Toll	Destructive Storm	Feb. 16, 1931	200	Destructive Storm	Dec. 9, 1973	59	Destructive Storm	May 27, 1979	53	Disaster	Date	People Damaged	Drought	Jan. 1998	263,455	Flood	April 12, 1986	215,000	Destructive Storm	March 1, 1983	200,014	Destructive Storm	Jan. 2, 1993	160,000	Destructive Storm	Oct. 24, 1972	120,000
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2. Administrative Division	<ul style="list-style-type: none"> Fiji is located in the central portion of the Southwest Pacific (Melanesia Region). It is composed of around 330 islands, and supports a population of around 0.85 million (a 2009 estimate). Fiji consists of the following four divisions. <ul style="list-style-type: none"> ① Central Division (Suva) ② Northern Division (Labasa) ③ Eastern Division (Levuka) ④ Western Division (Lautoka) These divisions are divided into 14 provinces. Provinces are divided into districts and villages, each having its own chief and council. 																															
3. Disaster Mitigation & Preparedness	<p>【Current Situation】</p> <ul style="list-style-type: none"> The disaster damage prevention is currently covered by NDMO (National Disaster Management Office), Ministry of Provincial Department and National Disaster Management. The NDMO consists of the following three units. <ul style="list-style-type: none"> ① Emergency, Planning and Coordination Unit ② Training, Education and Awareness Unit ③ Risk Management and Policy Research Unit <p>【Issues】</p> <ul style="list-style-type: none"> The Meteorological Service is ready with its 24-hour observation system. However, NDMO only observes disasters in its working hours in the day time. No backup electric power sources are prepared for operating the equipment for observation and communication in case of an electrical power failure. No hazard map is prepared. 																															
• Identification of Disaster Risks (HFA2)	<ul style="list-style-type: none"> The primary disaster risk in Fiji is cyclones. The Meteorological Service provides warning information on cyclones and works to predict the ocean weather in a range extending from the equator to 25 degrees south latitude, and then from 160 degrees east to 120 degrees west longitude. A map of the route taken by the Suva tsunami (caused by the 1953 Suva earthquake) has been made, and the Pacific Disaster Center has reproduced this event using a simulation on the current coastal topography and has estimated the amount of damage that would be caused to existing buildings in the coastal area. *5 A hazard map for the Taveuni volcano (1999) was prepared, and workshops are held for Fijian citizens as well as the 																															

<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	<p>national government.*5</p> <ul style="list-style-type: none"> JICA is implementing the community disaster damage prevention project in cooperation with SOPAC and NDMO. The US and the UNDP kicked off and led disaster damage control efforts in the Pacific Region during the early 1990s, pushing the establishment of a National Disaster Control Center and similar organizations.*6 The National Disaster Risk Management Plan was formulated in 1995. The National Disaster Management Act (NDMA) was enacted in 1998 and organizations from the national level to the local level were founded. NDMA was revised and updated in 2006. SOP concerning cyclones, tsunamis, and floods was prepared in 2011. 	<ul style="list-style-type: none"> The community disaster damage prevention activities are conducted in only limited areas and are not yet spread nationwide.
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<p>Improvement of Legal Systems:</p> <ul style="list-style-type: none"> System and framework for dealing with natural disasters: National Disaster Management Act 1998 (NDMA) In response to the agreement upon a disaster damage management framework for Oceania in 2005, Fiji formulated the National Disaster Risk Management Improvement Plan. <p>Formulation of the Plan: <Central Government Level> <National Disaster Risk Management Plan></p> <ul style="list-style-type: none"> The National Disaster Risk Management Plan was formulated in 1995. The National Disaster Management Act (NDMA) was enacted in 1998 and organizations from the national level to the local level were founded Plan Coping with Tsunami: the "Fiji Tsunami Warning System and Response Arrangements, Mineral Resources Department, 2004" has been formulated. The NDMA was revised and updated in 2006. The SOP concerning cyclones, tsunamis, and floods was prepared in 2011. 	<ul style="list-style-type: none"> "Disaster Council" has been founded in each province and consists of local committee members and local administrative officers of the ministries and agencies. However, this council mainly deals with items to be conducted after the disaster and makes insufficient preventive efforts.
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<p>Organizational System</p> <p>Fiji's Disaster Risk Reduction System</p> <pre> graph TD CABINET[CABINET] --> CSC[Cabinet Sub Committee] CSC --> NDMC[National DM Council] NDMC --> NDMO[NDMO] NDMO --> DivDISMAC[Div DISMAC] DivDISMAC --> DistDISMAC[District DISMAC] DistDISMAC --> Village[Village/Community/Settlement] NDMC --- MP[Mitigation & Prevention Committee] NDMC --- Prep[Preparedness Committee] NDMC --- Emer[Emergency Committee] NDMO --- EPC[EPC Unit] NDMO --- RMR[RMR Unit] NDMO --- TEA[TEA Unit] </pre> <p><Institutions for Coordination among Organizations> National Disaster Management Council (NDMC):</p> <ul style="list-style-type: none"> The council is composed of vice ministers from government agencies, and the NDMC is responsible for disaster damage management and the policy on disasters. The NDMC has set up the following three committees: <ol style="list-style-type: none"> 1)Emergency Committee 2)Preparedness Committee 3)Mitigation and Prevention Committee <p>National Disaster Controller</p> <ul style="list-style-type: none"> This controller instructs how to cope with a disaster and the measures for the damage prevention when the disaster strikes. <p><Central Institutions Concerning Disaster Damage Prevention></p>	<ul style="list-style-type: none"> The NDMO is insufficiently staffed given the volume and scope of the duties it performs. The Emergency Coordination Planning Unit, which plays the central role when a disaster occurs, does not operate around the clock, and would be unable to respond promptly should a disaster occur in the middle of the night. Obsolescence of equipment for observation. The budget for upper air observation is insufficient and the observation using radio sondes is sometimes cancelled. No tide gauge is installed and no tidal level forecast can be issued.

	<p><u>National Disaster Management Office (NDMO)</u></p> <ul style="list-style-type: none"> The NDMO is the implementing body for disaster damage management and is under the control of the Ministry of Land and Development. This office carries out specific activities for disaster damage management in Fiji. <p><u>National Emergency Management Center (NEMC)</u></p> <p>The NEMC is formed when a disaster requires a national-level response. It is primarily run by the NDMO.</p> <p><u>Fiji Meteorological Service (FMS)</u></p> <ul style="list-style-type: none"> The FMS is designated as a special regional meteorological center of the fifth zone (South Pacific) and as a Tropical Cyclone Warning Center (TCWC) for providing information on cyclones of the World Meteorological Organization (WMO), and as a Tropical Cyclone Advisory Center for Aviation advocated by WMO. <p><u>Mineral Resources Department (MRD)</u></p> <ul style="list-style-type: none"> The Earthquake Section of the MRD receives information from the Pacific Tsunami Warning Center (PTWC) in Hawaii and predicts whether a tsunami is likely to strike. If an official tsunami warning must be issued, the Earthquake Section informs the NDMO of the issuance. <p><u>Ministry of Primary Industries</u></p> <ul style="list-style-type: none"> The Department of Agriculture of the Ministry of Primary Industries implements agricultural policies, stable securing of food, land policies, measures against floods, etc. <p><u>Hydrological Section, Fiji Water Authority</u></p> <ul style="list-style-type: none"> This is an organization conducting hydrological observation. This observes the rainfall and the water levels of rivers and manages them as well as provides the Meteorological Service and NDMO with such data. For the early warning system (EWS), in the river basins (Rewa River basin and Navua River basin), IWA (National Institute of Water and Atmospheric Research, New Zealand is currently providing technical assistance, training for personnel, etc., for duties such as forecasting. <p><u>National Fire Authority</u></p> <ul style="list-style-type: none"> The Fire Authority of Fiji was established under the Fire Service Act of 1994. It has 44 stations throughout the country, and coordinates rescue operations with related organizations during floods. 	<ul style="list-style-type: none"> The NDMO is insufficiently staffed and can not always conduct 24-hour observation. The NDMO is not configured to provide its own tsunami forecast independently. The NDMO has no backup equipment such as electric generators. There are only measures for the agriculture sector against floods and their outcomes are limited to construction of water gates, etc. The observation equipment provided from JICA and that from NIWA have no compatibility between them and, therefore, a problem has arisen that the cost is doubled for their operation such as training of operators and maintenance of the equipment.
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	<p><Structural Measures></p> <ul style="list-style-type: none"> There are no river embankments, seawalls, or other flood-control structures for rivers in Fiji, and there are just a few instances of partial riverbed excavations. *5 <p><Regulations></p> <ul style="list-style-type: none"> Fijian building standards include earthquake codes (1983) which must be followed at the time of construction. *5 	<ul style="list-style-type: none"> The standard is applied only to the development projects in the urban area and the administration does not engage so often in such projects in rural areas.
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<p><Disaster Prevention Awareness Promotion Activities, Disaster Prevention Education, Disaster Drills></p> <ul style="list-style-type: none"> Tsunami awareness promotion activities are carried out by the Mineral Resources Department (MRD) for elementary school students and the local communities. The MRD, SOPAC, and the Pacific Disaster Center are putting together a tsunami awareness promotion kit. A hazard map for the Taveuni volcano was created in 1999, and workshops are carried out on the national and local-community levels. There has been a proposal to create educational information path through these citizen workshops. <p><Meteorological/Communication Systems></p> <ul style="list-style-type: none"> Currently NDMO collects all information for forecasting and warning, determines the need for them to be notified of to the 	<ul style="list-style-type: none"> A lack of funding has delayed the construction of a siren that would warn citizens of a tsunami as the final process of the warning system. This issue needs to be addressed. *5

	<p>local residents, and notifies the forecast or the warning through the press, local governments, etc., when necessary.</p> <ul style="list-style-type: none"> When a disaster occurs, warning is issued using SMS with the cooperation by Digicel (a cell phone carrier). <p><Cyclones and floods></p> <ul style="list-style-type: none"> Rewa River: An early warning system was introduced with the help of NZAP (1986). Nandi River: A JICA development study proposed the construction of spillways as a priority project, but this has yet to be implemented. <p><Tsunamis and Earthquakes></p> <ul style="list-style-type: none"> The Earthquake Section of the MRD analyzes the information on earthquakes and tsunamis (such as the magnitude, the location of the earthquake center, and the wave height) obtained from the Pacific Tsunami Warning Center (PTWC) and issues a warning based on the analysis. *5 JICA implemented the "Project for Operation of Earthquake Observation Network" which is a Fiji-Tonga technical assistance project for four years starting in October 2007. The two countries are now able to share the satellite line network. Based on this data sharing, more precise identification of the location of the earthquake center is enabled in a wide area. *5 	<ul style="list-style-type: none"> Enhancement of capability of NDMO personnel. Improvement of communication means is necessary. Especially, means for quick information transmission to rural areas is insufficient. The basic hydrological observation is insufficient. The Meteorological Service receives information on tsunami from PTWC and, based on it, a tsunami warning is issued by NDMO and the Mineral Resource Department. However, NDMO and the Mineral Resource Department do not operate for 24 hours and, therefore, this efforts need to be reviewed. 						
<ul style="list-style-type: none"> Financial Preparation (HFA1) 	<ul style="list-style-type: none"> The National Relief Fund is a fund that is usable when a disaster occurs. *4 There is an appeal to the national government to set up a Contingency Fund as part of the National Disaster Management Plan (draft). *4 	<ul style="list-style-type: none"> The Contingency Fund is insufficient for the expanded scale and the increased frequency of disasters. *4 						
<p>4. Emergency Response (HFA5)</p> <ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	<p>【Current Situation】</p> <ul style="list-style-type: none"> The National Disaster Management Council formulated the Cyclone Support Plan, which is tied to the National Disaster Risk Management Plan, in 1997. Cyclone warning procedures are also created annually. *5 Some provinces have formulated their province-level disaster management plans. In an emergency, communication personnel are dispatched from the relevant sections to NDMO and, thereby, unification is facilitated for instructions and information communication. 	<p>【Issues】</p> <ul style="list-style-type: none"> When a disaster strikes, the local residents of Fiji tend to bypass their provincial disaster management office and contact the national agencies directly. *5 						
<p>5. Policy on Community-based Disaster Management</p>	<ul style="list-style-type: none"> The UNDP has formulated plans against floods to be used as disaster management plans by local governments. The NDMO is currently training young people in the villages surrounding the capital city of Suva to create community-based disaster management plans, and each village is now preparing the plan. *5 Community disaster management education and awareness activities are being carried out for young people by making them part of community activities by the Department of Youth and Sports. *5 	<ul style="list-style-type: none"> The community-based disaster management plans lack substance and need to be fleshed out with further details. *5 No budget has been secured for the community-based disaster management education and awareness activities. Though an earthquake and tsunami hazard map was prepared for Suva, it is not used in community-based disaster management activities. 						
<p>6. Climate Change Adaptation</p>	<ul style="list-style-type: none"> Fiji and the other island nations of the Oceania are some of the most vulnerable parts of the world to the effects of climate change. Floods, cyclones, high tides, and droughts are expected to become more frequent and severer. The following table shows several World Bank indicators for the climate changes and natural disasters. <p style="text-align: center;">Indicators for Climate Changes and Natural Disasters *2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">Death Toll</td> <td>Droughts</td> <td>(persons/year)^{a)}</td> <td>0</td> </tr> <tr> <td>Floods and Destructive Storms</td> <td>(persons/year)^{a)}</td> <td>8</td> </tr> </table>	Death Toll	Droughts	(persons/year) ^{a)}	0	Floods and Destructive Storms	(persons/year) ^{a)}	8
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Rehabilitation plan for Navua hospital damaged by flood	2004																																																													
Development plan of mobile for relay during disaster in Fiji Broadcasting Authority	2005																																																													
Project	Year started	Year ended																																																												
Firefighting and fire rescue skills training course	2003	2008																																																												
	8. Assistance Strategies and Records of other Development Partners	<p><u>Australia</u></p> <ul style="list-style-type: none"> AusAID is supporting in various forms such as the wide-area support through SOPAC, etc., bilateral assistance, and implementation of projects through NGOs. (Regional cooperation) Program aiming at accumulating the sea surface observation records: See 6. Measures against Climate Change. Australia Tsunami Warning System (ATWS) Project: See 6 Measures against Climate Change (Bilateral cooperation) Australia implemented an awareness and education activity in Fiji for preparing for disasters consigning this activity to Foundation for the People of the South Pacific International (FSPI). This activity ended in 2006 and is reviewed at the time of the survey. Therefore, any future activity 																																																												

	<p>is not yet decided.</p> <p><u>New Zealand</u></p> <ul style="list-style-type: none"> NZAP is recently enhancing its cooperation for the Melanesia Region. Its cooperation is wide-area cooperation and is often through SOPAC, USP, and Secretariat of the Pacific Community (SPC). <p><u>UNDP</u></p> <ul style="list-style-type: none"> NDP Pacific Regional Office operates in a 20-staff-member system implementing development aid projects and cooperation programs for 15 countries. As the main activities of the office, the office implements the Disaster Reduction & Recovery Program associated with the climate changes in cooperation with SOPAC. UNDP is only staffed with the personnel for administration and, therefore, cooperates with SOPAC, etc., for the technical assistance and aid for activities. The wide-area activities across regions include the measures against the islands in Oceania and Caribbean Ocean as South-South Cooperation, and the disaster risk management. <p><u>UNOCHA: United Nations Office for the Coordination of Humanitarian Affairs</u></p> <ul style="list-style-type: none"> The UN Office for the Coordination of Humanitarian Affairs (UNOCHA) dispatches emergency management teams which conducts the information provision and coordination necessary for the emergency management for disasters, for governmental agencies, the donors, NGOs, etc., receiving the requests by the governmental agencies. Especially, the developing countries are the targets of the dispatches where sharing of information and coordination functions are poor. For Fiji, the team was dispatched for the cyclones "Thomas" struck the country in 2010. Recently, the coordination functions of various countries have been improved for emergency and, therefore, the office is making efforts emphasizing preparedness for disasters such as formulation of Contingency Plans of various countries, formulation of SOPs, and support for ITC. <u>Red Cross International</u> Red Cross Fiji has 25 staff members and conducts emergency life-saving activities for earthquakes. Red Cross Fiji has five departments and each of the departments conducts its own duties. In addition to the staff members, there are 500 volunteer members in the whole Fiji and volunteer members are annually recruited.
<p>9.International Networking</p>	<p><Framework for the Measures against Disasters in Oceania Region></p> <ul style="list-style-type: none"> The ETIC: International Tsunami Information Centre was founded under the Intergovernmental Oceanographic Commission (IOC) which is affiliated with UNESCO in 1965, and plays an important role for reduction of damage by tsunamis in the Pacific Region. <SOPAC: South Pacific Applied Geo-science Commission> SOPAC is a regional framework which was established in 1982 as an independent organization under the Economic and Social Division of the UN by its 18 member countries including Australia and New Zealand in addition to 16 island countries in the South Pacific Region. Its headquarters is situated in Suva in Fiji. This organization aims at maintaining in a health manner the natural resources in the Pacific Region. SOPAC prepared "Strategic Plan 2011-2015" in 2010 for its new development. According to it, the following three programs are the main activity goals. <ol style="list-style-type: none"> Ocean and Islands Program Water and Sanitation Program: Disaster Reduction Program: <ul style="list-style-type: none"> Reduction of disaster damage and measures against the climate changes Dissemination of disaster risk management at the local community level. Enhancement of, training for, and improvement of the administrative capability of the national agencies in charge of disaster management. Collection, clarification, storage, and transmission of basic data Establishment of the early warning system Preparation for disasters and the responsibility system For disaster damage prevention, Community Risk Programme was started in 1995, which consisted of three components of: 1)enhancement of disaster management capability; 2)mitigation of disaster damage; and 3)shift of comprehensive disaster risk management to the main stream. Specifically, as an activity for disaster damage prevention, basic information is collected and improved for preparing the hazard map of the coastal areas using GIS. <p><University of the South Pacific: USP></p> <ul style="list-style-type: none"> This university started the Disaster Risk Management Course in its graduate school in 2011 and, thereby, functions as a disaster damage prevention research institute for the member countries (the course is jointly operated by 12 countries in Oceania). The main subject of the course is studies and training on mainly the natural disasters caused by the climate changes in the Pacific Region.

		<p><Information Sharing></p> <ul style="list-style-type: none"> • SOPAC has established a map server as an on-line GIS for the countries in Oceania and has GIS software (MapInfo) for production and editing of contents. The map server includes various pieces of data which covers the whole country, the major islands, and the capital city, and is • operating using free software "Tiki-wiki" which supports Linux.
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Source:

- *1 EM-DAT: The OFDA/CRED International Disaster Database, Universite Catholique de Louvain – Brussels (<http://www.emdat.be>) (accessed on 18 January 2010)
- *2 SOPAC: RELATIONSHIP BETWEEN NATURAL DISASTERS AND POVERTY: A FIJI CASE STUDY, Jun 2009 (http://www.sopac.org/tiki-sopac_download.php?path=/data/virlib/MR/MR0678.pdf&file=MR0678.pdf&loc=MR)
- *3 Wikipedia: website (http://en.wikipedia.org/wiki/Fiji#Political_divisions , http://en.wikipedia.org/wiki/Local_government_of_Fiji) (accessed on March, 2012)
- *4 Ministry of Food and Disaster Management of Bangladesh, National Progress Report on the Implementation of the Hyogo Framework of Action, Bangladesh, Prevention Web (<http://www.preventionweb.net/english/countryies/asia/bgd/>) (2009)
- *5 JICA: Report on Program formation Study on Measures for Natural Disaster (2008)
- *6 JICA: Report on Project formation Study for Community based Disaster prevention Program (Fiji & Vanuatu) (2008)
- *7 JICA: Report on Project formation Study for Community based Disaster prevention Program (Fiji & Vanuatu) (March, 2007)
- *8 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010) (http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II) ,

Note: About items without the mark of reference number, it is based on the following report prepared in April, 2012.
 JICA: Data Collection Survey on Disaster Management in the Pacific (Final Report , April, 2012)

Appendix 2

Inventory on Disaster Management in Solomon

Disaster Management in Solomon (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Solomon Islands are located in the tropical rainforest climate zone and their weather is hot and humid throughout the year. The temperature of their capital city, Honiara reaches 32°C at the highest and 21°C at the lowest. However, in the inland areas, the highest temperature reaches 35°C. Their precipitation marks the highest in March reaching 430 mm and marks the lowest in August reaching about 100 mm. Their precipitation becomes relatively small from late May to early December. The rainy season starts in January and ends in April and the rain there is characterized by that the rain falls hard in a short time. Cyclones tend to strike the islands from November to January next year. Disaster damage occurring on the islands is caused by cyclones and high tide, and by earthquakes and tsunamis. Especially, tsunamis statistically strike the islands once in 4.3 years. According to EM-DAT, 100 or more human lives were lost in each of three recorded natural disasters from 1900 to 2012. 30,000 or more people suffered from each of three natural disasters from 1900 to 2012. 																					
2. Administrative Division	<ul style="list-style-type: none"> Solomon Islands are groups of islands in Melanesia in South Pacific and form a country having the islands as its national domain. The country is a member of the Commonwealth and one of the British Commonwealth of Nations. The country has a population of 523 thousands and rules its domain dividing the whole country into the nine provinces and a capital city area: 																					
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> The disaster risks are high tide, cyclones, earthquakes, and tsunamis, SOPAC has completed the improvement of depth sounding and tsunami models in Solomon (2008). 																					
• Identification of Disaster Risks (HFA2)	<ul style="list-style-type: none"> The efforts for preventive measures against disaster damage in the Oceania were started in early 1990s lead by the US and UNDP, and the National Disaster Management Headquarters, etc., were actively founded 																					
• Sharing Information on Disaster Risks with Community (HFA2)	<ul style="list-style-type: none"> The National Disaster Act and the National Disaster Council Act were enacted in 1989. The National Disaster Council (NDC) and the National Disaster Management Office (NDMO) were founded. A nationwide disaster damage prevention system was constructed. The National Disaster Plan (NDP) was formulated in 1980 and was updated in 2010. Based on this plan, four committees for preparedness, forecasting and warning, rehabilitation, and reconstruction were founded. 	【Issues】 <ul style="list-style-type: none"> These are member organizations for the most of the cluster and SOP was not yet completed. Completion of SOP for each local government is delayed compared to that of the central government. 																				
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	<p>Organizational System</p> <ul style="list-style-type: none"> The following table shows the governmental agencies in charge of each step of the preparedness, immediate response, and rehabilitation and reconstruction for a disaster by type of disaster. <table border="1"> <thead> <tr> <th>Type of Disaster</th> <th>Preparedness</th> <th>Immediate Response</th> <th>Rehabilitation and Reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earth-quakes and Tsunamis</td> <td>1) Seismic Bureau (observation) 2) NDMO (issuance of warnings)</td> <td>NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.</td> <td>NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.</td> </tr> <tr> <td>Floods</td> <td>The Infrastructure Development Ministry (measures for structures)</td> <td>Same as above.</td> <td>Same as above.</td> </tr> <tr> <td>Sediment Disaster</td> <td>Preventive measures should be taken by the agency in charge of the facilities for which damage is expected to occur.</td> <td>Same as above.</td> <td>Same as above.</td> </tr> <tr> <td>Cyclones</td> <td>Meteorological Service (forecasting and warning)</td> <td>Same as above</td> <td>Same as above.</td> </tr> </tbody> </table>	Type of Disaster	Preparedness	Immediate Response	Rehabilitation and Reconstruction	Earth-quakes and Tsunamis	1) Seismic Bureau (observation) 2) NDMO (issuance of warnings)	NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.	NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.	Floods	The Infrastructure Development Ministry (measures for structures)	Same as above.	Same as above.	Sediment Disaster	Preventive measures should be taken by the agency in charge of the facilities for which damage is expected to occur.	Same as above.	Same as above.	Cyclones	Meteorological Service (forecasting and warning)	Same as above	Same as above.	
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• Establishment and Enhancement of Disaster Management System (HFA1)																						
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)	<ul style="list-style-type: none"> The technical standards of New Zealand are mainly applied to designs of roads and bridges. Measures for structures against floods are not yet implemented. 	<ul style="list-style-type: none"> Because of the restraint on the national budget, no measure for the river structures has been taken. 																				
• Development of Warning System and Evacuation System (HFA 2, 3)	<ul style="list-style-type: none"> NDMO controls at the national level. The national radio station (SIBC) provides information on disasters through broadcasting on AM radio. 	<ul style="list-style-type: none"> Enhancement of capability of NDMO personnel. Improvement of communication means is necessary. Especially, means for quick information transmission to rural areas is insufficient. 																				
• Financial Preparation (HFA1)	<ul style="list-style-type: none"> A large portion of the national budget is used for fixed expenses for maintenance including the salaries of the government officials. Therefore, aids are relied on for the funds for disaster damage prevention and rehabilitation from the disaster damage. The annual budget for the Meteorological Service: 63 million yen (2011) The annual budget for the Seismic Bureau: 0.85 million yen (2011) 	<ul style="list-style-type: none"> Any increase of the national budget is difficult to hope and the country must consider projects for disaster management and disaster damage prevention based permanently on the aids. 																				
4. Emergency Response (HFA5)	<p>【Current Situation】</p> <ul style="list-style-type: none"> When a disaster occurs, the National Disaster Operation Committee (N-DOC) is urgently founded and the National Emergency Operation Centre (NEOC) of NDMO acts as the direction center to cope with the disaster. Under N-DOC, five types of cluster for the fields of Welfare, Livelihood, Initial Response and Assessment, Public service, and Infrastructure were founded. The SOP for each cluster has already been formulated and, furthermore, the SOP for each constituting factor of a cluster is being formulated. In an emergency, NDMO collects and clarifies the relevant information and, thereby, unification of instructions and information is facilitated. 	<p>【Issues】</p> <ul style="list-style-type: none"> No SOP is completed for each local government. No infrastructure for communication is established in areas except the areas around the capital city. 																				
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> Disaster management activities are conducted by the aid institutions. 	<ul style="list-style-type: none"> Enhancement of the management capability for community disaster management. 																				
6. Climate Change Adaptation	<ul style="list-style-type: none"> The Disaster Reduction Program is planned in SOPAC and measures against the climate change are under consideration as a part of the program. 																					
7. Records of Major Assistance by JICA	<Grant aid> Urgent Grant Aid for Disaster by Earthquake and Tsunami in Solomon Islands (2007)																					
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> AusAID along with NDMO is actively holding "Pacific Community Focused Integrated Disaster Risk Reduction" as education for disaster management named "Strength of Community Capability for Risk Reduction" as a part of education for local communities and school education. NZAP cooperated with SOPAC to implement "Coordination of the Island Climate Update", a regional climate bulleting providing accurate and timely outlooks and projections in association with SPREP and SOPAC. The EU is currently implementing "Solomon Islands Climate Change Adaptation Programme" in its ten-staff-member system (2011-2013). In addition, as a wide-area project, the EU is also enhancing the capability to manage the climate changes in the island countries in Oceania. The WB dispatches personnel (Policy Advisor) to support NDMO. The WB also implements "Increasing Resilience to Climate Change and Natural Hazard in Solomon Islands". ADB implements "Pacific Climate Change Response" and "Pacific Catastrophe Risk Assessment and Financing Initiative" In Solomon Islands, UNDP implements three projects of "Enhancing Resilience of Communities in Solomon Islands to the Adverse Effects of Climate Change in Agriculture and Food Security" (2008-2012), "UNDP Response to the Flash Flood in the Solomon Islands" (2009-2010), and "Recovery Assistance for Earthquake and Tsunami in the Solomon Islands" (2010-2011). International Red Cross in cooperation with NDMO conducts community disaster management activity. In addition, it increases its storage of emergency assistance materials and, when a disaster occurs, dispatches assistance troupes to the site of the disaster. OXfam (NGO) implements a technical support project for NDMO "Community Based Disaster Risk Deduction, Disaster Response Emergency Logistics". 																					
9. International Networking	<p><Framework Concerning Disaster Damage Prevention in Oceania></p> <ul style="list-style-type: none"> The International Tsunami Information Centre (ITIC) was founded in 1965 under the Intergovernmental Oceanographic Commission (IOC) which was affiliated with UNESCO, and plays an important role to reduce tsunami damage in the Pacific Region. 																					

Disaster Management in Solomon

Current Situation and Challenges	1. Futures of Disasters	<ul style="list-style-type: none"> Solomon Islands are located in the tropical rainforest climate zone and their weather is hot and humid throughout the year. The temperature of their capital city, Honiara reaches 32°C at the highest and 21°C at the lowest. However, in the inland areas, the highest temperature reaches 35°C. Their precipitation marks the highest in March reaching 430 mm and marks the lowest in August reaching about 100 mm. Their precipitation becomes relatively smaller from late May to early December. The rainy season starts in January and ends in April and the rain there is characterized by that the rain falls hard in a short time. *1 Cyclones tend to strike the islands from November to January next year. *1 Disaster damage occurring on the islands is caused by cyclones and high tide, and by earthquakes and tsunamis. Especially, tsunamis statistically strike the islands once in 4.3 years. According to EM-DAT, 100 or more human lives were lost in each of three recorded natural disasters from 1900 to 2012. 30,000 or more people were suffered from each of three natural disasters from 1900 to 2012. *2 Disasters each Took 100 or More Human Lives of Natural Disasters Occurring from 1900 to 2012 <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death Toll</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>1956</td> <td>200</td> </tr> <tr> <td>Earthquake and Tsunami</td> <td>June 21, 1975</td> <td>200</td> </tr> <tr> <td>Storm</td> <td>May 19, 1986</td> <td>101</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Natural Disasters Occurring in 1900 to 2012 Each Damaging 30,000 or More People <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>People Damaged</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>May 19, 1986</td> <td>150,000</td> </tr> <tr> <td>Storm</td> <td>January 4, 1993</td> <td>88,500</td> </tr> <tr> <td>Storm</td> <td>April 1982</td> <td>30,000</td> </tr> </tbody> </table>	Disaster	Date	Death Toll	Storm	1956	200	Earthquake and Tsunami	June 21, 1975	200	Storm	May 19, 1986	101	Disaster	Date	People Damaged	Storm	May 19, 1986	150,000	Storm	January 4, 1993	88,500	Storm	April 1982	30,000
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3. Disaster Mitigation & Preparedness	<p>【Current Situation】</p> <ul style="list-style-type: none"> The system is established in which the Seismic Bureau observes earthquakes and NDMO issues warnings. The Meteorological Service is in charge of forecasting and warning for cyclones. <p>【Issues】</p> <ul style="list-style-type: none"> Though the Meteorological Service takes the 24-hour operation system, NDMO only observes within its operating hours in the day time. No backup electric power sources are prepared for operating the equipment for observation and communication in case of an electrical power failure. No hazard map is prepared. Recognition of hazards and strict dissemination of preventive measures are insufficient. 																									
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) Sharing Information on Disaster Risks with Community (HFA2) Development of Legislative Framework and Disaster 	<ul style="list-style-type: none"> The disaster risks are considered for those of high tide, cyclones, earthquakes, and tsunamis, SOPAC has completed the improvement of depth sounding and tsunami models in Solomon (2008). Boring studies, preparation of earthquake catalogs, and earthquake management analysis of the ground are conducted in the four capital cities of Solomon, Fiji, Vanuatu, and Tonga to classify each ground. For this, approaches of NEHRP (National Earthquake Hazard Reduction Program) of the US are used and the outcomes are published on the map server. The efforts for preventive measures against disaster damage in the Oceania were started in early 1990s lead by the US and UNDP, and the National Disaster Management Headquarters, etc., were actively founded. The National Disaster Act and the National Disaster Council Act were enacted in 1989. The National Disaster Council (NDC) and the National Disaster Management Office (NDMO) were founded. 																									

<p>Management Policy & Plans (HFA1)</p>	<ul style="list-style-type: none"> Provincial Disaster Management Committee was founded under and attached to NDC and, thereby, a nationwide disaster damage prevention system was constructed. The National Disaster Plan (NDP) was formulated in 1980 and was updated in 2010. Based on this plan, four committees for preparedness, forecasting and warning, rehabilitation, and reconstruction were founded under NDC. 	<p>local government is delayed compared to that of the central government.</p>																				
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<p><Agencies in Charge of Disaster Damage Prevention></p> <ul style="list-style-type: none"> The following table shows the governmental agencies in charge of each step of the preparedness, immediate response, and rehabilitation and reconstruction for a disaster by type of disaster. <p>Agencies in Charge of Each Step by Type of Disaster</p> <table border="1"> <thead> <tr> <th>Type of Disaster</th> <th>Preparedness</th> <th>Immediate Response</th> <th>Rehabilitation and Reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earth-quakes and Tsunamis</td> <td>1)Seismic Bureau (observation) 2)NDMO (issuance of warnings)</td> <td>NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.</td> <td>NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.</td> </tr> <tr> <td>Floods</td> <td>The Infrastructure Development Ministry (measures for structures)</td> <td>Same as above.</td> <td>Same as above.</td> </tr> <tr> <td>Sediment Disaster</td> <td>Preventive measures should be taken by the agency in charge of the facilities for which damage is expected to occur.</td> <td>Same as above.</td> <td>Same as above.</td> </tr> <tr> <td>Cyclones</td> <td>Meteorologica l Service (forecasting and warning)</td> <td>Same as above</td> <td>Same as above.</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <u>Earthquakes</u>: The Seismology Section of the Geology Department of Ministry of Mines, Energy and Rural Electrification (MMERE) is responsible for items concerning earthquakes. <u>Tsunamis</u>: The Meteorological Service for which PTWC in Hawaii provides information is responsible for items concerning tsunamis. NDMO is also provided with information from PTWC. <u>Earthquake observation</u> is computerized and the management of this is unified on computer terminals. The Water Resource Agency of MMERE is responsible for monitoring of water-related data such as the precipitation and river water levels. 	Type of Disaster	Preparedness	Immediate Response	Rehabilitation and Reconstruction	Earth-quakes and Tsunamis	1)Seismic Bureau (observation) 2)NDMO (issuance of warnings)	NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.	NDMO acts as the coordination agency. The agency in charge of the location and facilities damaged conducts the practical duties.	Floods	The Infrastructure Development Ministry (measures for structures)	Same as above.	Same as above.	Sediment Disaster	Preventive measures should be taken by the agency in charge of the facilities for which damage is expected to occur.	Same as above.	Same as above.	Cyclones	Meteorologica l Service (forecasting and warning)	Same as above	Same as above.	<p>Water utilization is the main duty and the viewpoint of disaster damage prevention is weak.</p>
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<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> NDMO controls at the national level. The national radio station (SIBC) provides information on disasters through broadcasting on AM radio. 	<ul style="list-style-type: none"> Enhancement of capability of NDMO personnel. Improvement of communication means is necessary. Especially, means for quick information transmission to rural areas is insufficient. The observation points are insufficient and the country itself cannot identify the earthquake center and the energy. No hazard map is prepared.
<ul style="list-style-type: none"> Financial Preparation (HFA1) 	<ul style="list-style-type: none"> A large portion of the national budget is used for fixed expenses for maintenance including the salaries of the government officials. Therefore, the actual state is that aids are relied on for the funds for disaster damage prevention and rehabilitation from the disaster damage. The annual budget for the Meteorological Service: 63 million yen (2011) The annual budget for the Seismic Bureau: 0.85 million yen (2011) 	<ul style="list-style-type: none"> Any increase of the national budget is difficult to hope and the country must consider projects for disaster management and disaster damage prevention based permanently on the aids.
<p>4. Emergency Response (HFA5)</p> <ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	<p>【Current Situation】</p> <ul style="list-style-type: none"> When a disaster occurs, the National Disaster Operation Committee (N-DOC) is urgently founded and , the National Emergency Operation Centre (NEOC) of NDMO acts as the direction center to cope with the disaster. Under N-DOC, five types of cluster for the fields of Welfare, Livelihood, Initial Response and Assessment, Public service, and Infrastructure were founded. To support these clusters, the Logistics and Support and the NEMO Management Unit was founded. The SOP for each cluster has already been formulated and, furthermore, the SOP for each constituting factor of a cluster is being formulated. In an emergency, NDMO collects and clarifies the relevant information and, thereby, unification of instructions and information is facilitated. 	<p>【Issues】</p> <ul style="list-style-type: none"> No SOP is completed for each local government. No infrastructure for communication is established in areas except the areas around the capital city.
<p>5. Policy on Community-based Disaster Management</p>	<ul style="list-style-type: none"> Disaster management activities are conducted by the aid institutions. 	<ul style="list-style-type: none"> Enhancement of the management capability for community disaster management.
<p>6. Climate Change Adaptation</p>	<ul style="list-style-type: none"> The Disaster Reduction Program is planned in SOPAC and measures against the climate change are under consideration as a part of the program. 	

Assistance to Challenge	7. Records of Major Assistance by JICA	<p><Development Research >*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Technical cooperation project>*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Equipment provision >*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Country-and issue based training >*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Grant aid >*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td>Urgent Grant Aid for Disaster by Earthquake and Tsunami in Solomon Islands (Via UNIFEF)</td> <td>2007</td> <td> </td> </tr> <tr> <td>Urgent Grant Aid for Disaster by Earthquake and Tsunami in Solomon Islands (Via IFRC)</td> <td>2007</td> <td> </td> </tr> </tbody> </table> <p><Grant aid for grassroots activities >*3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year implemented	Amount	Urgent Grant Aid for Disaster by Earthquake and Tsunami in Solomon Islands (Via UNIFEF)	2007		Urgent Grant Aid for Disaster by Earthquake and Tsunami in Solomon Islands (Via IFRC)	2007		Project	Year started	Year ended			
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8.Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> • AusAID along with NDMO is actively holding "Pacific Community Focused Integrated Disaster Risk Reduction" as education for disaster management named "Strength of Community Capability for Risk Reduction" as a part of education for local communities and school education. • NZAP cooperated with SOPAC to implement "Coordination of the Island Climate Update", a regional climate bulleting providing accurate and timely outlooks and projections in association with SPREP and SOPAC. • The EU is currently implementing "Solomon Islands Climate Change Adaptation Programme" in its ten-staff-member system (2011-2013). In addition, as a wide-area project, the EU is also enhancing the capability to manage the climate changes in the island countries in Oceania. • The WB dispatches personnel (Policy Advisor) to support NDMO. The WB also implements "Increasing Resilience to Climate Change and Natural Hazard in Solomon Islands". • ADB implements "Pacific Climate Change Response" and "Pacific Catastrophe Risk Assessment and Financing Initiative" • In Solomon Islands, UNDP implements three projects of "Enhancing Resilience of Communities in Solomon Islands to the Adverse Effects of Climate Change in Agriculture and Food Security" (2008-2012), "UNDP Response to the Flash Flood in the Solomon Islands" (2009-2010), and "Recovery Assistance for Earthquake and Tsunami in the Solomon Islands" (2010-2011). • International Red Cross in cooperation with NDMO conducts community disaster management activity. In addition, it increases its storage of emergency assistance materials and, when a disaster occurs, dispatches assistance troupes to the site of the disaster. • Oxfam (NGO) implements a technical support project for NDMO "Community Based Disaster Risk Deduction, Disaster Response Emergency Logistics". 																																								
9.International Networking	<p><Framework Concerning Disaster Damage Prevention in Oceania></p> <ul style="list-style-type: none"> • The International Tsunami Information Centre (ITIC) was founded in 1965 under the Intergovernmental Oceanographic Commission (IOC) which was affiliated with UNESCO, and plays an important role to reduce tsunami damage in the Pacific Region. 																																								

Source : *1 Wikipedia on the web site

*2 Web site (www.emdat.be)

*3 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)

(http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)

Note: About item without the mark of reference number, it is based on the following report prepared in April, 2012.

JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

Appendix 3

Inventory on Disaster Management in Papua New Guinea

Disaster Management in Papua New Guinea (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Independent State of Papua New Guinea is located on the border between the Pacific Plate and India Plate and, similarly to Japan, is located in the Pacific Ring of Fire where volcanic eruptions and earthquakes often occur. Therefore, the country has been often damaged by its volcanos, and many earthquakes and tsunamis associated with the earthquakes. In Papua New Guinea, cyclones strike less often but cause damage to the country by destructive storms, floods, land slide disasters, etc. According to EM-DAT, 500 or more human lives were lost in each of three recorded natural disasters. 50,000 or more people were suffered from each of six natural disasters. 																	
2.Administrative Division	<ul style="list-style-type: none"> Papua New Guinea consists of the following 19 provinces and the National Capital District. Each province has its council and cabinet, the central government has strong power and authority differently from that of the US, etc. 																	
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> Disaster risks in Papua New Guinea are those from volcanic activities, destructive storms, floods, tsunamis, droughts, etc. Although records of heavy disasters are still retained, disaster risk evaluation is not sufficient at the national, provincial, and regional levels. *5 Risk maps are prepared only for very limited volcanos. 																	
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> In 1999, ADRC jointly made efforts for the Disaster Prevention Awareness Promotion Project in Papua New Guinea. 																	
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> The National Disaster Management Act was enacted in 1984 and was revised in 1987. The Disaster Management Plan was enacted in 1987. 	<p>【Issues】</p> <ul style="list-style-type: none"> The National Disaster Management Act only stipulated the preparation for disasters and measures to be taken when a disaster occurs. SOP to be taken when a disaster occurs is not prepared not only at the national-government level but also the local-government level. 																
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<p>Organizational System</p> <p><u>National Disaster Management Organization</u></p> <ul style="list-style-type: none"> For the disaster management system at the national-government level, the National Disaster Committee was founded as the top organization concerning the preparedness for disasters under the Dept. of Prime Minister and the National Executive Council (NEC: the cabinet consisting of 27 ministers). This committee consists of seven under-secretaries from the relevant ministries and two donor representatives. <p style="text-align: center;">Organizations in Charge of Disaster Management</p> <table border="1"> <thead> <tr> <th></th> <th>Preparedness</th> <th>Immediate Response</th> <th>Rehabilitation, Reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earth-quakes and Tsunamis</td> <td>Department of Mineral Policy and Geo-Hazards Management</td> <td>The relevant agencies of the facilities and the areas implement the responses under the coordination by National Disaster Center (NDC).</td> <td>The relevant agencies of the facilities and the areas which are damaged.</td> </tr> <tr> <td>Floods and Damage by Sand and Soil</td> <td>Department of Public Project</td> <td>Same as above</td> <td>Agencies relevant to the facilities and areas damaged by the disaster.</td> </tr> <tr> <td>Cyclones and Heavy Rains</td> <td>Weather Agency</td> <td>Same as above</td> <td>Agencies relevant to the facilities and areas damaged by the disaster.</td> </tr> </tbody> </table>		Preparedness	Immediate Response	Rehabilitation, Reconstruction	Earth-quakes and Tsunamis	Department of Mineral Policy and Geo-Hazards Management	The relevant agencies of the facilities and the areas implement the responses under the coordination by National Disaster Center (NDC).	The relevant agencies of the facilities and the areas which are damaged.	Floods and Damage by Sand and Soil	Department of Public Project	Same as above	Agencies relevant to the facilities and areas damaged by the disaster.	Cyclones and Heavy Rains	Weather Agency	Same as above	Agencies relevant to the facilities and areas damaged by the disaster.	<ul style="list-style-type: none"> The disaster damage prevention sector is not prioritized in the national policy and, therefore, the awareness of disaster damage prevention is insufficient throughout the government. Therefore, this organization only has insufficient personnel and capability. In addition, no system for responsibility and communication is established. It is a fact that working on disaster damage prevention does not appeal to the voters and, therefore, does not add any incentive to politicians.
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<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	<ul style="list-style-type: none"> The Department of Works is, under the law, in charge of constructions for rivers. However, this department mainly implements construction of roads and bridges and implements no constructions for rivers and no constructions against floods. The institution which comprehensively covers floods and sediment disasters does not exist within the national government. 	<ul style="list-style-type: none"> No land development is conducted in PNG which takes into consideration the disaster damage prevention. 																
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> The Papua New Guinea National Weather Service: (NWS) of the Department of Transport is in charge of meteorological observation and weather forecast and warning. 	<ul style="list-style-type: none"> No observation is conducted in the southeast portion of the country which is the area for cyclones to be generated in South Pacific and, therefore, to quickly and accurately grasp the state of a cyclone is still impossible. The number of observation points is low and no sufficient meteorological information is obtained. 																
<ul style="list-style-type: none"> Financial Preparation (HFA1) 		<ul style="list-style-type: none"> Though the plans do exist, their feasibility is problematic. 																
4.Emergency Response (HFA5)	<ul style="list-style-type: none"> Each province has formulated its own emergency and disaster management plan The National Disaster Centre is in charge of the emergency response. According to a report by UNDP, the capability of PNG for responding to an emergency has improved. The committee of each province must formulate an individual emergency response plan for each active volcano. 	<ul style="list-style-type: none"> Provinces that each has an emergency response plan are limited to only some provinces which hold volcanos of Manam, Kar Kar, Ulawun, and Rabaul volcanos. 																
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> The National Disaster Awareness and Preparedness Committee founded in 1999 is in charge of the public relations concerning natural disasters. ISDR has in PNG a risk information system such as seminar workshops and posters to promote the disaster damage prevention for children, ordinary citizens, organizational management, etc. 	<ul style="list-style-type: none"> Recently, the National Disaster Awareness and Preparedness Committee have not been assembled. 																
6.Climate Change Adaptation	<ul style="list-style-type: none"> The Office of Climate Change and Development (OCCD) is an institution to coordinate policies and activities concerning all the climate changes in PNG and also a designated national institution under the United Nation's Framework Convention on Climate Change (UNFCCC) on the climate changes. This office was founded by remodeling its previous form in 2010 that was the Office of Climate Change and Environment Sustainability (OCCES), and now coordinates the draft measures against the climate changes from the agencies in the government and plays a role of coordinator among aid institutions as an organization directly controlled by the Prime Minister. The office currently handles its duties with 20 staff members. 																	
7. Records of Major Assistance by JICA	< Technical cooperation project > Capacity Building Project on Forest Resources for Climate Change Adaptation (2011-2014)																	
Assistance to Challenge	<p><u>AusAID</u></p> <ul style="list-style-type: none"> AusAID places its office in the office of UNHCR in Port Moresby and has about 2 staffs in charge of the disaster sector. A reporting and coordination meeting for international donors including JICA is monthly held coordinated by the PNG National Disaster Center. In addition, non-regular coordination meetings are assembled when a large-scale disaster occurs. <p><Regional Cooperation></p> <ul style="list-style-type: none"> For cooperation among regions, activities are conducted focusing on the measures against landslides for the inland area of the main island through SOPAC and World Bank. AusAID financially supports these activities. PNG is positioned as a hot spot of natural disasters such as volcanos, floods, earthquakes, tsunamis, cyclones, river overflows, high tides, landslides, and droughts. <p><Bilateral Cooperation></p> <ul style="list-style-type: none"> In the bilateral cooperation for PNG, the following five activities are conducted in the disaster damage prevention sector. <ol style="list-style-type: none"> 1)Support for the activity of NDC (measures against the climate changes, gender issues) 2)The disaster management activity in New Britain Province (the measures against disasters caused by volcanos, earthquakes, and tsunamis in Rabaul) 3)Humanitarian assistance in cooperation with UNOCHA 4)Support for activities for reducing the disaster risks in cooperation with SOPAC and the World Bank 5)Disaster management dissemination activity in communities (such as enhancement of community capability, strict dissemination and education, and preparedness in advance) <p><u>EU</u></p> <ul style="list-style-type: none"> EU has shifted the measures against the climate changes to its mainstream, and has prioritized health and disaster management. The projects which are currently implemented are as follows and their progress is delayed by the factors such as financial and personnel factors of the PNG government. EU prioritizes communication and visibility in implementing the program, and supports seminars and workshops together with SOPAC aiming at constructing the system in which progress and activity state can be monitored at all the levels of implementation of the program. 																	
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Disaster Management in PNG

Current Situation and Challenges	1.Features of Disasters	<ul style="list-style-type: none"> Independent State of Papua New Guinea is located on the border between the Pacific Plate and India Plate and, similarly to Japan, is located in the Pacific Ring of Fire where volcanic eruptions and earthquakes often occur. Therefore, the country has been often damaged by its volcanos, and many earthquakes and tsunamis associated with the earthquakes. New Guinea Island has on it Bismarck Mountains crossing the island laterally in its central portion. Damage caused by sand and soil such as land slides often occur at the foot of the mountains and in the hilly areas. In Papua New Guinea, cyclones strike less often but cause damage to the country by destructive storms, floods, land slide disasters, etc. According to EM-DAT, 500 or more human lives were lost in each of three recorded natural disasters from 1900 to 2012. 50,000 or more people were suffered from each of six natural disasters from 1900 to 2012. *1 Disasters each Took 500 or More Human Lives of Natural Disasters Occurring from 1900 to 2012 <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Disaster</th> <th>Date of Occurrence</th> <th>Death Toll</th> </tr> </thead> <tbody> <tr> <td>Volcanic Activity</td> <td>Jan. 15, 1951</td> <td>3,000</td> </tr> <tr> <td>Tsunami</td> <td>July 17, 1998</td> <td>2,182</td> </tr> <tr> <td>Volcanic Activity</td> <td>May 29, 1937</td> <td>506</td> </tr> </tbody> </table> Natural Disasters Occurring in 1900 to 2012 Each Damaging 50,000 or More People <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Disaster</th> <th>Date of Occurrence</th> <th>People Damaged</th> </tr> </thead> <tbody> <tr> <td>Drought</td> <td>Sept. 1997</td> <td>500,000</td> </tr> <tr> <td>Storm (Cyclone)</td> <td>Nov. 12, 2007</td> <td>162,140</td> </tr> <tr> <td>Volcanic Activity</td> <td>Sept. 19, 1994</td> <td>152,002</td> </tr> <tr> <td>Flood</td> <td>May 1992</td> <td>90,000</td> </tr> <tr> <td>Flood</td> <td>Dec. 8, 2008</td> <td>75,300</td> </tr> </tbody> </table> 	Disaster	Date of Occurrence	Death Toll	Volcanic Activity	Jan. 15, 1951	3,000	Tsunami	July 17, 1998	2,182	Volcanic Activity	May 29, 1937	506	Disaster	Date of Occurrence	People Damaged	Drought	Sept. 1997	500,000	Storm (Cyclone)	Nov. 12, 2007	162,140	Volcanic Activity	Sept. 19, 1994	152,002	Flood	May 1992	90,000	Flood	Dec. 8, 2008	75,300
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3. Disaster Mitigation & Preparedness	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 40%;">【Current Situation】</th> <th style="width: 30%;">【Issues】</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) </td> <td> <ul style="list-style-type: none"> Disaster risks in Papua New Guinea are those from volcanic activities, destructive storms, floods, tsunamis, droughts, etc. Although records of heavy disasters are still retained, disaster risk evaluation is not sufficient at the national, provincial, and regional levels. *5 Risk maps are prepared only for very limited volcanos. *5 </td> <td> <ul style="list-style-type: none"> Risk maps are prepared only for very limited volcanos, and no rules are established for analysis and monitoring of risk assessment and vulnerability assessment in other areas. *5 </td> </tr> <tr> <td> <ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) </td> <td> <ul style="list-style-type: none"> In 1999, ADRC jointly made efforts for the Disaster Prevention Awareness Promotion Project in Papua New Guinea. The overview of the project is as follows. <ol style="list-style-type: none"> Provision for the local residents with sufficient knowledge about tsunami damage prevention and also with sufficient knowledge from experts and leaders. Transmission of the outcomes of the case studies on the risks and dangers of the geological condition and the nature, and making efforts for promoting awareness of the ordinary people. In West New Britain Province, implementation of program for promoting awareness about danger of the volcano, Ulawun. In Madang and Oro Provinces, implementation of a similar local education plan on the danger of volcanos. </td> <td> <ul style="list-style-type: none"> The outcome of the project is not known. </td> </tr> <tr> <td> <ul style="list-style-type: none"> Development of Legislative Framework and Disaster </td> <td> <ul style="list-style-type: none"> The National Disaster Management Act was enacted in 1984 and was revised in 1987. The Disaster Management Plan was enacted in 1987. However, none of the two has been revised later on. </td> <td> <ul style="list-style-type: none"> The National Disaster Management Act only stipulated the preparation for disasters and measures to be </td> </tr> </tbody> </table>		【Current Situation】	【Issues】	<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 	<ul style="list-style-type: none"> Disaster risks in Papua New Guinea are those from volcanic activities, destructive storms, floods, tsunamis, droughts, etc. Although records of heavy disasters are still retained, disaster risk evaluation is not sufficient at the national, provincial, and regional levels. *5 Risk maps are prepared only for very limited volcanos. *5 	<ul style="list-style-type: none"> Risk maps are prepared only for very limited volcanos, and no rules are established for analysis and monitoring of risk assessment and vulnerability assessment in other areas. *5 	<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> In 1999, ADRC jointly made efforts for the Disaster Prevention Awareness Promotion Project in Papua New Guinea. The overview of the project is as follows. <ol style="list-style-type: none"> Provision for the local residents with sufficient knowledge about tsunami damage prevention and also with sufficient knowledge from experts and leaders. Transmission of the outcomes of the case studies on the risks and dangers of the geological condition and the nature, and making efforts for promoting awareness of the ordinary people. In West New Britain Province, implementation of program for promoting awareness about danger of the volcano, Ulawun. In Madang and Oro Provinces, implementation of a similar local education plan on the danger of volcanos. 	<ul style="list-style-type: none"> The outcome of the project is not known. 	<ul style="list-style-type: none"> Development of Legislative Framework and Disaster 	<ul style="list-style-type: none"> The National Disaster Management Act was enacted in 1984 and was revised in 1987. The Disaster Management Plan was enacted in 1987. However, none of the two has been revised later on. 	<ul style="list-style-type: none"> The National Disaster Management Act only stipulated the preparation for disasters and measures to be 																			
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<p>Management Policy & Plans (HFA1)</p>	<ul style="list-style-type: none"> • <u>Disaster Management Plan</u> was enacted in 1987. This plan included the Operational Document for Response Management as follows. *5 <ol style="list-style-type: none"> In 2003, the National and Provincial Disaster Risk Management Handbooks. 2005 to 2015, the National Framework for Papua New Guinea Disaster Risk Mitigation and Disaster Management. 	<p>taken when a disaster occurs. *5</p> <ul style="list-style-type: none"> • Standard Operation Procedure (SOP) which specifically stipulates the procedures for measures to be taken when a disaster occurs is not prepared not only at the national-government level but also the local-government level. 																
<ul style="list-style-type: none"> • Establishment and Enhancement of Disaster Management System (HFA1) 	<p><u>National Disaster Management Organization</u></p> <ul style="list-style-type: none"> • For the disaster management system at the national-government level, the National Disaster Committee was founded as the top organization concerning the preparedness for disasters under the Dept. of Prime Minister and the National Executive Council (NEC: the cabinet consisting of 27 ministers). This committee consists of seven under-secretaries from the relevant ministries and two donor representatives. <p style="text-align: center;">Organizations in Charge of Disaster Management</p> <table border="1"> <thead> <tr> <th></th> <th>Preparedness</th> <th>Immediate Response</th> <th>Rehabilitation, Reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earth-quakes and Tsunamis</td> <td>Department of Mineral Policy and Geo-Hazards Management</td> <td>The relevant agencies of the facilities and the areas implement the responses under the coordination by National Disaster Center (NDC).</td> <td>The relevant agencies of the facilities and the areas which are damaged.</td> </tr> <tr> <td>Floods and Damage by Sand and Soil</td> <td>Department of Public Project</td> <td>Same as above</td> <td>Agencies relevant to the facilities and areas damaged by the disaster.</td> </tr> <tr> <td>Cyclones and Heavy Rains</td> <td>Weather Agency</td> <td>Same as above</td> <td>Agencies relevant to the facilities and areas damaged by the disaster.</td> </tr> </tbody> </table> <p><u>Geo-hazards Division of Department of Mineral Policy and Geo-hazards Management</u></p> <ul style="list-style-type: none"> • The Geo-Hazard Division of the Department of Mineral Policy and Geo-hazards Management (DMPG) is responsible for observation of earthquakes and tsunamis in PNG. • The Geo-Hazards Division consists of three sections of the Port Moresby Geophysical Observatory (POMGEO) which observes earthquakes and tsunamis, the Rabaul Volcanic Observatory (RVO) which observes the volcanic activity of New Britain Island, and the Engineering Geology which is responsible for researches on landslides and disasters caused by the ground. <p><u>National Weather Service</u></p> <ul style="list-style-type: none"> • Papua New Guinea National Weather Service (NWS) of the Department of Transport is in charge of observation and forecasts of, and warning for weather. • The National Weather Service currently has manned observatories at 14 airports in the country and carries out its meteorological duties such as weather observation, weather forecast, and issuance of warnings. Its current senior organization is the Department of Transport in line with its history starting with aviation weather observation. However, 		Preparedness	Immediate Response	Rehabilitation, Reconstruction	Earth-quakes and Tsunamis	Department of Mineral Policy and Geo-Hazards Management	The relevant agencies of the facilities and the areas implement the responses under the coordination by National Disaster Center (NDC).	The relevant agencies of the facilities and the areas which are damaged.	Floods and Damage by Sand and Soil	Department of Public Project	Same as above	Agencies relevant to the facilities and areas damaged by the disaster.	Cyclones and Heavy Rains	Weather Agency	Same as above	Agencies relevant to the facilities and areas damaged by the disaster.	<ul style="list-style-type: none"> • The disaster damage prevention sector is not prioritized in the national policy and, therefore, the awareness of disaster damage prevention is insufficient throughout the government. Therefore, this organization only has insufficient personnel and capability. In addition, no system for responsibility and communication is established between the committee and other organizations. • It is a fact that working on disaster damage prevention does not appeal to the voters and, therefore, does not add any incentive to politicians. • Any of the observation networks of the National Weather Service has not reached a reliable level. *5
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	<p>its actual duties have become incompatible with the organization form associated with the diversification of the meteorological duties in the recent years such as the measures against the warming. Therefore, NWS is aiming at getting independent as the "Bureau of Meteorology".</p> <p><Earthquake></p> <ul style="list-style-type: none"> • Seismographs are installed at three points of Port Moresby, Rabaul, and Manus. The equipment installed at Port Moresby is a wideband seismograph based on the Global Seismographic Network installed by the USGS, and those at the other two points were installed by the Geoscience Australia. The observation data of each seismograph is sent to the network of the country which installed the seismograph and is not directly sent to POMGEO. • Information from PTWC, JMA, etc., is obtained through the Internet and facsimile for the information on the earthquake center. • Information such as tsunami warning is received through SMS and by facsimile and is transferred to NDC on HF radio, cell phones, by facsimile, and e-mail. • Transmission of the information from the national government to provinces is conducted on cell phones, by facsimile, and SMS and is being improved while transmission from the provinces to districts does not work. • Many areas have no electricity power supply and telephone network and, therefore, it takes several days for information on a disaster occurring in a remote area to reach the central government. Otherwise, the information sometimes does not reach the central government. Therefore, there may be cases where no emergency measures are taken. <p><Tsunami></p> <ul style="list-style-type: none"> • For tsunami observation, the information is obtained by accessing tsunami observation data from the equipment in Manus installed by Australia. • The data is transmitted to National Tidal Facility Australia (NTFA) through the satellite telephone line and is stored there. Three sea-bed pressure sensors are installed for observing the volcanos and tsunamis around Rabaul and the data obtained there is transmitted on HF radio. <p><Volcanos></p> <ul style="list-style-type: none"> • Intensive observation is conducted for information on volcanos, and observatories are installed at 15 volcanos which may erupt throughout the country. • Because of insufficient secured parts and engineers, the maintenance is difficult. In addition, expenses for visiting remote areas where observation equipment is installed fall into arrears and the traffic situation obstructs accesses. Therefore, no sufficient measures are taken. <p><Flood></p> <ul style="list-style-type: none"> • The institution in charge of hydrological observation concerning the flood and sediment disaster sector in PNG is the Water Resources Management Branch of the Department of Environment and Conservation, under the law. The Department of Works is in charge of constructions for rivers, under the law. However, this department mainly implements construction of roads and bridges and implements no constructions for rivers and no constructions against floods. The institution which comprehensively covers floods and sediment disasters does not exist within the national government. • Observation of hydrological data such as precipitation and river water level is covered by the Water Resources Management Branch of the Department of Environment and Conservation. • The Water Resource Management Branch is planning as its future duties construction of networks of the observation systems (for Laloki, Kumusi, and Gumini Rivers), enhancement of personnel, and recruiting of young engineers. 	<ul style="list-style-type: none"> • Because the number of observation points is insufficient, the earthquake center and the magnitude can not be determined within the country. • The country also relies on USGS and AusAID for maintenance of the equipment because of its lack of technology. • Monitoring of observation data is limited within the operating hours due to the insufficient staffing. • Because electric power supply is not established in remote areas, the means of communication are limited. The budget for preparing printed materials is insufficient. • Serious issues are insufficient engineers and incomplete preparedness for tsunami. • As in the case where the specification of equipment provided from USGS and that from AusAID are different from each other, the systems and programs are different by donor and are not incompatible with each other. This makes the maintenance more difficult. • It is an issue that with which means disaster information is notified of to the residents in rural areas after preparing the information. • Most observation was discontinued in 1994 and, currently, observation points are five points for two rivers, and the data is insufficient as the basic reference for water resource management which was the original aim.
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	<p><u>Communication and Information Systems</u></p> <ul style="list-style-type: none"> The alarming and information systems in PNG to be used when a disaster occurs are generally fragile. Securement of communication means used among the sections in charge when a disaster occurs is left to ministries and agencies. Therefore, only the least necessary communication means by telephones and facsimile are prepared. Radio broadcast provided by the National Broadcast Service is mainly used as the alarming system to be used when a disaster occurs. 	<ul style="list-style-type: none"> As far as each ministry or agency individually improves its communication environment, it is difficult to suppress the influence of the variation of the external environment on the communication expenses. 													
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	<ul style="list-style-type: none"> The Department of Works is, under the law, in charge of constructions for rivers. However, this department mainly implements construction of roads and bridges and implements no constructions for rivers and no constructions against floods. The institution which comprehensively covers floods and sediment disasters does not exist within the national government. 	<ul style="list-style-type: none"> No land development is conducted in PNG which takes into consideration the disaster damage prevention. 													
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> The Papua New Guinea National Weather Service: (NWS) of the Department of Transport is in charge of meteorological observation and weather forecast and warning. 	<ul style="list-style-type: none"> No observation is conducted in the southeast portion of the country which is the area for cyclones to be generated in South Pacific and, therefore, to quickly and accurately grasp the state of a cyclone is still impossible. The number of observation points is low and no sufficient meteorological information is obtained. 													
<ul style="list-style-type: none"> Financial Preparation (HFA1) 		<ul style="list-style-type: none"> Though the plans do exist, their feasibility is problematic. *5 													
<p>4. Emergency Response (HFA5)</p> <ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	<ul style="list-style-type: none"> Each province has formulated its own emergency and disaster management plan *4 The National Disaster Centre is in charge of the emergency response. *5 According to a report by UNDP, the capability of PNG for responding to an emergency has improved. The committee of each province must formulate an individual emergency response plan for each active volcano. *4 	<ul style="list-style-type: none"> Provinces that each has an emergency response plan are limited to only some provinces which hold volcanos of Manam, Kar Kar, Ulawun, and Rabaul volcanos. *4 													
<p>5. Policy on Community-based Disaster Management</p>	<ul style="list-style-type: none"> The National Disaster Awareness and Preparedness Committee founded in 1999 is in charge of the public relations concerning natural disasters. *5 ISDR has in PNG a risk information system such as seminar workshops and posters to promote the disaster damage prevention for children, ordinary citizens, organizational management, etc. *5 	<ul style="list-style-type: none"> Recently, the National Disaster Awareness and Preparedness Committee have not been assembled. 													
<p>6. Climate Change Adaptation</p>	<ul style="list-style-type: none"> The Office of Climate Change and Development (OCCD) is an institution to coordinate policies and activities concerning all the climate changes in PNG and also a designated national institution under the United Nation's Framework Convention on Climate Change (UNFCCC) on the climate changes. This office was founded by remodeling its previous form in 2010 that was the Office of Climate Change and Environment Sustainability (OCCES), and now coordinates the draft measures against the climate changes from the agencies in the government and plays a role of coordinator among aid institutions as an organization directly controlled by the Prime Minister. The office currently handles its duties with 20 staff members. The office is a policymaking organization and actively conducts its activities. 														
<p>7. Records of Major Assistance by JICA</p>	<p><Development Research >*6</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Technical cooperation project >*6</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Project	Year started	Year ended				Project	Year started	Year ended			
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8.Assistance Strategies and Records of other Development Partners	<p><u>AusAID</u></p> <ul style="list-style-type: none"> AusAID places its office in the office of UNHCR in Port Moresby and has about 150 staff members including two staff members in charge of the disaster sector. The partner country which AusAID most prioritizes in Oceania is PNG. The annual budget of AusAID for PNG is about 9 million Australian dollars. A reporting and coordination meeting for international donors including JICA is monthly held coordinated by the PNG National Disaster Center. In addition, non-regular coordination meetings are assembled when a large-scale disaster occurs. <p><Regional Cooperation></p> <ul style="list-style-type: none"> For cooperation among regions, activities are conducted focusing on the measures against landslides for the inland area of the main island through SOPAC and World Bank. AusAID financially supports these activities. PNG is positioned as a hot spot of natural disasters such as volcanos, floods, earthquakes, tsunamis, cyclones, river overflows, high tides, landslides, and droughts. The largest economic loss is caused by a volcanic activity followed by a flood and by an earthquake. <p><Bilateral Cooperation></p> <ul style="list-style-type: none"> In the bilateral cooperation for PNG, the following five activities are conducted in the disaster damage prevention sector. <ol style="list-style-type: none"> 1)Support for the activity of NDC (measures against the climate changes, gender issues) 2)The disaster management activity in New Britain Province (the measures against disasters caused by volcanos, earthquakes, and tsunamis in Rabaul) 3)Humanitarian assistance in cooperation with UNOCHA 4)Support for activities for reducing the disaster risks in cooperation with SOPAC and the World Bank 5)Disaster management dissemination activity in communities (such as enhancement of community capability, strict dissemination and education, and preparedness in advance) <p><u>EU</u></p> <ul style="list-style-type: none"> EU has shifted the measures against the climate changes to its mainstream, and has prioritized health and disaster management. The projects which are currently implemented are as follows and their progress is delayed by the factors such as financial and personnel factors of the PNG government. EU prioritizes communication and visibility in implementing the program, and supports seminars and workshops together with SOPAC aiming at constructing the system in which progress and activity state can be monitored at all the levels of implementation of the program. 																																							
9.International Networking																																								

- Source :
- *1 EM-DAT: The OFDA/CRED International Disaster Database, Universite Catholique de Louvain – Brussels (<http://www.emdat.be>) (Accessed on 10 April 2012)
 - *2 Wikipedia on the web site (http://en.wikipedia.org/wiki/Bangladesh#Divisions.2C_districts.2C_and_upazilas) (Accessed on 12 April, 2012)
 - *3 Asian Disaster Reduction Center (ADRC); web-site
 - *4 UN World Conference for Disaster Prevention: Country Report (2005)
 - *5 ISDR, The World Bank: Disaster Risk Management Programs for Priority Countries (2009)
 - *6 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010) (http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)
- Note: About item without the mark of reference number, it is based on the following report prepared in April, 2012.
 JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

Appendix 4

Inventory on Disaster Management in Vanuatu

Disaster Management in Vanuatu (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> • Republic of Vanuatu consists from 83 islands with the land area of 12, 2000 km². The country's population is approximately 240,000. • The country has a tropical rainforest climate. In the capital city of Port Vila, the average temperature in the winter is 25 degrees Celsius and in the summer, 29 degrees Celsius. The average annual rainfall is 2,300 mm. • Earthquakes and rain storms are identified as primary natural disaster risks. • According to the EM-DAT, there are two natural disasters between 1900 and 2010 with the death toll of over 100. During this period, there is one natural disaster with more than 50,000 victims. 	
2. Administrative Division	<ul style="list-style-type: none"> • Republic of Vanuatu has six administrative areas: Torba, Sanma, Penama, Malampa, Shefa and Tafea. Papua 	
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> • Earthquakes, tsunami, and rain storms are identified as natural disaster risks. • Nautical charts are incomplete and there are no tsunami hazard maps. • The public has limited knowledge on disaster prevention. 	
• Identification of Disaster Risks (HFA2)	<ul style="list-style-type: none"> • Standard Operation Procedure (SOP) is being developed under the assistance of an Australian NGO, which will be the guideline to be followed in the event of natural disaster 	
• Sharing Information on Disaster Risks with Community (HFA2)	<ul style="list-style-type: none"> • Public awareness-raising activities on disaster prevention activities are conducted in communities. In schools, education on disaster prevention is conducted and 40 schools have an emergency action plan. 	
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	<ul style="list-style-type: none"> • In 2000, 'National Disaster Management Act' was formulated which is currently being revised (as of Feb. 2012). • In 2006, Disaster Risk Reduction and Disaster Management National Action Plan was formulated. 	【Issues】
• Establishment and Enhancement of Disaster Management System (HFA1)	<ul style="list-style-type: none"> • National Disaster Committee (NDC) is the highest decision making body. • In the event of natural disaster, National Disaster Management Office (NDMO) will be set up and act as the secretariat of NDC. NDMO will be the coordinator among relevant agencies. • Vanuatu Meteorological Service has SOP. Two islands which have the possibility of volcanic eruption also have SOP. 	<ul style="list-style-type: none"> • SOPs for various administrative levels and major natural disasters need to be developed. • Capacity development of personnel in charge of disaster prevention is needed.
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)	<ul style="list-style-type: none"> • There are no records of actual implementation of structural reinforcement for the flood or restrictions on the land use. 	<ul style="list-style-type: none"> • There are no records of actual implementation of structural reinforcements due to budget limitations.
• Development of Warning System and Evacuation System (HFA 2, 3)	<ul style="list-style-type: none"> • Warnings and evacuation procedure exist for Tsunami only. The warnings are given out to the public via radio, e-mails and in the internet. • Disaster information is given out via state owned Radio-Vanuatu (AM wave). 	<ul style="list-style-type: none"> • Radio broadcast cannot be received in some islands or remote areas.
• Financial Preparation (HFA1)	<ul style="list-style-type: none"> • Japan provides assistance in the field of meteorology. • Australia provides assistance in the formulation of national disaster prevention plan. • New Zealand provides assistance in the field of volcanic activity. • France provides assistance in the field of meteorology and earthquake. USA provides assistance in the field of disaster management. UNDP and World Bank also provide assistance. 	
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> • NEMO coordinates the emergency response which will be implemented by responsible agencies. • Main agencies in charge are department of public infrastructure, department of meteorology/ geology and natural disaster. 	
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> • Disaster prevention educations are given in schools. 	<ul style="list-style-type: none"> • Not enough information on disaster prevention is disseminated in the community.
6. Climate Change Adaptation	<ul style="list-style-type: none"> • An Australian agency, Commonwealth Science Research Organization provides assistance on the survey of impact of cyclones. • AusAID through the funding from the World Bank provides assistance on the National Advisory Committee for Climate Change (NACCC). 	
7. Records of Major Assistance by JICA	<p>< Technical cooperation project > Strengthen Weather Forecasting Capability and formulation of Network System (2009)</p> <p>< Country-and issue based training > The Third Country Training on Weather in the Pacific (2010-2012)</p>	
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> • AusAID implements projects on disaster prevention in the communities. Main programs are as follows: <ul style="list-style-type: none"> 1) Pacific Community Focused Disaster Risk Reduction 2) Building Disaster Response and Preparedness of Caritas Partners in the Pacific 3) Improving Community Based Emergency Preparedness in Vanuatu • NZAP provides assistance on the volcanic activity monitoring system and restoration of water supply facilities. • World Bank implements a project on the reduction of natural disaster risk. • Global Environment Facility (GEF) in collaboration with Pacific Islands Applied Geo-science Commission (SOPAC) provides assistance on the counter measures on Luganville floods. • UNICEF implements a project on 'Community Resilience and Coping with Climate Change and Natural Disasters in Vanuatu'. 	
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Disaster Management in Vanuatu

Current Situation and Challenges	1. Features of Disasters	<ul style="list-style-type: none"> • Republic of Vanuatu consists of 83 islands with the land area of 12, 2000 km². The country's population is approximately 240,000. • The country has a tropical rainforest climate. In the capital city of Port Vila, the average temperature in the winter is 25 degrees Celsius and in the summer, 29 degrees Celsius. The average annual rainfall is 2,300 mm. • Earthquakes and rain storms are identified as primary natural disaster risks. • According to the EM-DAT, there are two natural disasters between 1900 and 2012 with the death toll of over 100. During this period, there is one natural disaster with more than 50,000 victims. <p>Natural disasters with large number of death tolls (1900 – 2012)*2</p> <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>December 24, 1951</td> <td>100</td> </tr> <tr> <td>Earthquake</td> <td>April 21, 1997</td> <td>100</td> </tr> </tbody> </table> <p>Natural disasters with more than 50,000 victims (1900 – 2012) *2</p> <table border="1"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>January 16, 1985</td> <td>117,500</td> </tr> <tr> <td>Storm</td> <td>December 25, 2004</td> <td>54,508</td> </tr> </tbody> </table>	Disaster	Date	Death toll	Storm	December 24, 1951	100	Earthquake	April 21, 1997	100	Disaster	Date	No. of victims	Storm	January 16, 1985	117,500	Storm	December 25, 2004	54,508
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	3. Disaster Mitigation & Preparedness	Current situation	Issues																	
	<ul style="list-style-type: none"> • Identification of Disaster Risks (HFA2) 	<ul style="list-style-type: none"> • Earthquakes, tsunami, and storms are identified as natural disaster risks. • Nautical charts are incomplete and there are no tsunami hazard maps. • The public has limited knowledge on disaster prevention. 	<ul style="list-style-type: none"> • The dangers of natural disasters and prevention measures are not well known. • There are only limited budget and personnel available. 																	
<ul style="list-style-type: none"> • Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> • Standard Operation Procedure (SOP) is being developed under the assistance of an Australian NGO, which will be the guideline to be followed in the event of natural disaster *3 • Public awareness-raising activities on disaster prevention activities are conducted in communities. In schools, education on disaster prevention are conducted and forty schools have an emergency action plan *3. 																			
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4. Emergency Response (HFA5) *3	<p>Current situation</p> <ul style="list-style-type: none"> NEMO coordinates the emergency response which will be implemented by responsible agencies. Main agencies in charge are department of public infrastructure, department of meteorology/ geology and natural disaster. 																																						
<ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 																																							
5. Policy on Community-based Disaster Management*3	<ul style="list-style-type: none"> Disaster prevention educations are given in schools. 	<ul style="list-style-type: none"> Not enough information on disaster prevention is disseminated in the community. 																																					
6. Climate Change Adaptation	<ul style="list-style-type: none"> An Australian agency, Commonwealth Science Research Organization provides assistance on the survey of impact of cyclones. AusAID through the funding from the World Bank provides assistance on the National Advisory Committee for Climate Change (NACCC). 																																						
Assistance to Challenge	7. Records of Major Assistance by JICA	<p><Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Technical cooperation project>*4</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Strengthen Weather Forecasting Capability and formulation of Network System</td> <td>2009</td> <td>2009</td> </tr> </tbody> </table> <p><Equipment provision>*4</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>The Third Country Training on Weather in the Pacific</td> <td>2010</td> <td>2012</td> </tr> </tbody> </table> <p><Grant aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant aid for grassroots activities ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Project	Year started	Year ended				Project	Year started	Year ended	Strengthen Weather Forecasting Capability and formulation of Network System	2009	2009	Project	Year started	Year ended				Project	Year started	Year ended	The Third Country Training on Weather in the Pacific	2010	2012	Project	Year implemented	Amount				Project	Year started	Year ended			
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8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> AusAID implements projects on disaster prevention in the communities. Main programs are as follows: <ol style="list-style-type: none"> Pacific Community Focused Disaster Risk Reduction Building Disaster Response and Preparedness of Caritas Partners in the Pacific Improving Community Based Emergency Preparedness in Vanuatu NZAP provides assistance on the volcanic activity monitoring system and restoration of water supply facilities. World Bank implements a project on the reduction of natural disaster risk. Global Environment Facility (GEF) in collaboration with Pacific Islands Applied Geo-science Commission (SOPAC) provides assistance on the counter measures on Luganville floods. UNICEF implements a project on 'Community Resilience and Coping with Climate Change and Natural Disasters in Vanuatu'. 																																						
9. International Networking																																							

Source : *1 Web-site (ja.wikipedia.org)
 *2 Web-site (www.emdat.be)
 *3 JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)
 *4 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)
http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II

- Note: About item without the mark of reference number, it is based on the following report prepared in April, 2012.
JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

Appendix 5

Inventory on Disaster Management in Tonga

Disaster Management in Tonga (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Tonga consists of some 170 islands with an area of 719 km² and a population of approximately 104,000 persons. It has a tropical rainforest climate. The mean temperature at Nuku'alofa, capital, is 26°C in January and 21°C in July. Its annual precipitation is 1,643mm. Its disaster risks include earthquakes, cyclones and volcanoes. According to EM-DAT, there are no natural disasters that took a toll of over ten persons' lives and there are three natural disasters that affected more than 10,000 persons during the period from 1900 to 2012. 	
2. Administrative Division	<ul style="list-style-type: none"> The country is divided into five administrative divisions, Niuas, Vava'u, Ha'apai, Tongatapu, 	
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> Disaster risks include earthquakes, cyclones, and volcanoes. The community lacks disaster control awareness. The SOP, which becomes a manual at the time of disaster in each village, is in preparation with assistance from an Australian NGO. *3 	
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> Disaster risks include earthquakes, cyclones, and volcanoes. The community lacks disaster control awareness. The SOP, which becomes a manual at the time of disaster in each village, is in preparation with assistance from an Australian NGO. *3 	
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> The National Disaster Management Act was stipulated in 2007, whereby the National Emergency Management Plan that had been formulated in 1987 was revised in 2008. 	【Issues】
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<ul style="list-style-type: none"> The National Disaster Committee (NDC) is the highest decision-making organization. At the time of disaster the National Emergency Coordination Center starts its operation under the control of NDC. Under the command of the National Emergency Operation Committee (NEOC), the National Emergency Management Office (NEMO) coordinates the entire activities. A draft of the Standard Operation Procedure (SOP) that will become a manual at the national level at the time of disaster has been completed (Feb. 2012). 	
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	<ul style="list-style-type: none"> There are any records of neither structural measures nor regulations on land use. 	<ul style="list-style-type: none"> No structural measures have been taken due to a budgetary constraint.
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> The warning and evacuation systems will be put into practice only at the time of tsunamis. The warning system uses radio, TV, telephone and SMS. Disaster information is broadcasted by a radio station (Radio Tonga 1) on AM The Meteorology Division provides information by SMS in collaboration with DIGICEL, a cell phone carrier. No organizations than the Meteorology Division work under the around-the-clock system. 	<ul style="list-style-type: none"> SMS has not been widely used. Other organizations than the Meteorology Division do not work under the 24-hour system, and an emergency warning system has not been fully developed. Communication systems are poor.
<ul style="list-style-type: none"> Financial Preparation (HFA1) 	<ul style="list-style-type: none"> Japan provides its assistance in the fields of earthquakes and meteorological observations. WB extends its assistance to the rehabilitation from cyclone damage. 	
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> Emergency responses are taken by the ministries/agencies which are primarily related to the disaster-affected facilities/areas through coordination by NEMO. The competent ministry is the Ministry of Public Works and Disaster Relief Activities. NEMO coordinates the emergency response which will be implemented by responsible agencies. 	
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> Disaster preparedness education and disaster management activities are carried out by the state. 	<ul style="list-style-type: none"> There is a shortage of personnel and budget.
6. Climate Change Adaptation	<ul style="list-style-type: none"> The Pacific Plan and the Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated as disaster reduction programs by SOPAC, based on which measures have been taken. SPC, SOPAC: Strategic Plan 2011-2015 	
7. Records of Major Assistance by JICA	<p>< Technical cooperation project > Strengthen Weather Forecasting Capability and formulation of Network System (2009) Operation Project for Earthquake Observation Network (2009-2011) < Country-and issue based training > The Third Country Training on Weather in the Pacific (2010-2012)</p>	
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> AusAID implements projects concerning community-based disaster managements. The major projects are <ol style="list-style-type: none"> Pacific Community-Focused Disaster Risk Reduction Strengthen Pacific DRM through AusAID National Action Plan Pacific Disaster Management Partnership NZAP actively provides assistance to emergency relief activities at the time of disaster but does not include disaster management. The framework of FRANZ is applied. EU implements a project for building adaptive capacity to climate change (region-wide) and disaster mitigation program (region-wide). WB implements a project for rehabilitation/reconstruction from tsunami damage (400 million yen). 	
9. International Networking		

Disaster Management in Tonga

Current Situation and Challenges	1. Features of Disasters	<ul style="list-style-type: none"> Tonga consists of some 170 islands with an area of 719 km² and a population of approximately 104,000 persons. (Wikipedia)*1 It has a tropical rainforest climate. The mean temperature at Nuku'alofa, capital, is 26°C in January and 21°C in July. Its annual precipitation is 1,643mm.*1 Its disaster risks include earthquakes, cyclones and volcanic activities. According to EM-DAT, there are no natural calamities that took a toll of over ten persons' lives and there are three natural calamities that affected more than 10,000 persons during the period from 1900 to 2012.*2 <p style="text-align: center;">Natural calamity that took the heaviest death toll between 1900 and 2012*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Earthquake</td> <td>September 29, 2009</td> <td>9</td> </tr> </tbody> </table> <p style="text-align: center;">Natural calamities that affected more than 10,000 persons between 1900 and 2012*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Cyclone</td> <td>March 3, 1982</td> <td>146,510</td> </tr> <tr> <td>Cyclone</td> <td>December 31, 2001</td> <td>16,500</td> </tr> <tr> <td>Cyclone</td> <td>December 27, 1997</td> <td>10,005</td> </tr> </tbody> </table>		Disaster	Date	Death toll	Earthquake	September 29, 2009	9	Disaster	Date	No. of victims	Cyclone	March 3, 1982	146,510	Cyclone	December 31, 2001	16,500	Cyclone	December 27, 1997	10,005
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2. Administrative Division*1	The country is divided into five administrative divisions, Niuas, Vava'u, Ha'apai, Tongatapu, and 'Eua.																				
3. Disaster Mitigation & Preparedness	【Current situation】	【Issue】																			
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) *3 	<ul style="list-style-type: none"> Disaster risks include earthquakes, cyclones, and volcanic activities. The community lacks a disaster control awareness. 																				
<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) *3 	<ul style="list-style-type: none"> The Standard Operation Procedure (SOP), which becomes a manual at the time of disaster in each village, is in preparation with assistance from an Australian NGO. *3 The community carries out enlightenment activities for disaster preparedness at ordinary times. Disaster prevention education is offered at school. An emergency response plan has been formulated at 40 schools. *3 																				
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) *3 	<ul style="list-style-type: none"> The National Disaster Management Act was stipulated in 2007, whereby the National Emergency Management Plan that had been formulated in 1987 was revised in 2008. *3 																				
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) *3 	<ul style="list-style-type: none"> The National Disaster Committee (NDC) is the highest decision-making organization. At the time of disaster the National Emergency Coordination Center starts its operation under the control of NDC. Under the command of the National Emergency Operation Committee (NEOC), the National Emergency Management Office (NEMO) coordinates the entire activities. A draft of the Standard Operation Procedure (SOP) that will become a manual at the national level at the time of disaster has been completed (Feb. 2012). 																				
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3 	<ul style="list-style-type: none"> There are any records of neither structural measures nor regulations on land use. 	<ul style="list-style-type: none"> No structural measures have been taken due to a budgetary constraint. 																			
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA2,3) *3 	<ul style="list-style-type: none"> The warning and evacuation systems will be put into practice only at the time of tsunamis. The warning system uses radio, TV, telephone and SMS. Disaster information is broadcasted by a radio station (Radio Tonga 1) on AM The Meteorology Division provides information by SMS in collaboration with DIGICEL, a cell phone carrier. 	<ul style="list-style-type: none"> SMS has not been widely used. Other organizations than the Meteorology Division do not work under the 24-hour system, and an emergency warning system has not been fully developed. Communication systems are poor. 																			

	<ul style="list-style-type: none"> • Financial Preparation (HFA1) *3 	<ul style="list-style-type: none"> • No organizations than the Meteorology Division work under the around-the-clock system. • Japan provides its assistance in the fields of earthquakes and meteorological observations. • WB extends its assistance to the rehabilitation from cyclone damage. 	<ul style="list-style-type: none"> • 																																											
	<p>4. Emergency Response (HFA5) *3</p> <ul style="list-style-type: none"> • Establishment of emergency response system • Lifesaving • Helping affected people 	<p>【Current situation】</p> <ul style="list-style-type: none"> • Emergency responses are taken by the ministries/agencies which are primarily related to the disaster-affected facilities/areas through coordination by NEMO. • The competent ministry is the Ministry of Public Works and Disaster Relief Activities. 	<p>【Issue】</p>																																											
	<p>5. Policy on Community-based Disaster Management *3</p>	<ul style="list-style-type: none"> • Disaster preparedness education and disaster management activities are carried out by the state. 	<ul style="list-style-type: none"> • There is a shortage of personnel and budget. 																																											
	<p>6. Climate Change Adaptation *4</p>	<ul style="list-style-type: none"> • The Pacific Plan and the Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated as disaster reduction programs by SOPAC, based on which measures have been taken. • SPC, SOPAC: Strategic Plan 2011-2015 *4 																																												
Assistance to Challenge	<p>7. Records of Major Assistance by JICA *5</p>	<p><Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Technical cooperation project ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Strengthen Weather Forecasting Capability and Formulation of Network System</td> <td>2009</td> <td>2009</td> </tr> <tr> <td>Operation Project for Earthquake Observation Network</td> <td>2009</td> <td>2011</td> </tr> </tbody> </table> <p><Equipment provision ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>The Third Country Training on Weather in the Pacific</td> <td>2010</td> <td>2012</td> </tr> </tbody> </table> <p><Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Strengthen Weather Forecasting Capability and Formulation of Network System</td> <td>2009</td> <td>2009</td> </tr> <tr> <td>Training on Disaster Prevention and Weather Field in the Pacific</td> <td>2010</td> <td>2012</td> </tr> </tbody> </table> <p><Grant Aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant aid for grassroots activities ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>			Project	Year started	Year ended				Project	Year started	Year ended	Strengthen Weather Forecasting Capability and Formulation of Network System	2009	2009	Operation Project for Earthquake Observation Network	2009	2011	Project	Year started	Year ended	The Third Country Training on Weather in the Pacific	2010	2012	Project	Year started	Year ended	Strengthen Weather Forecasting Capability and Formulation of Network System	2009	2009	Training on Disaster Prevention and Weather Field in the Pacific	2010	2012	Project	Year implemented	Amount				Project	Year started	Year ended			
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<p>8. Assistance Strategies and Records of other Development Partners *3</p>	<ul style="list-style-type: none"> • AusAID implements projects concerning community-based disaster managements. The major projects are <ol style="list-style-type: none"> 1) Pacific Community-Focused Disaster Risk Reduction 2) Strengthen Pacific DRM through AusAID National Action Plan 3) Pacific Disaster Management Partnership • NZAP actively provides assistance to emergency relief activities at the time of disaster but does not include disaster management. The framework of FRANZ is applied. • EU implements a project for building adaptive capacity to climate change (region-wide) and disaster mitigation program (region-wide). • WB implements a project for rehabilitation/reconstruction from tsunami damage (400 million yen). 																																													
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Appendix 6

Inventory on Disaster Management in Samoa

Disaster Management in Samoa (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Samoa has a hot and humid tropical marine climate with an annual mean temperature of 26~27°C. It has a dry season (May ~ October) and a wet season (Nov. ~ April). Its yearly rainfall is 2,970mm at Apia. *1 Its major disasters include cyclones, earthquakes and tsunamis, and high tides. According to EM-DAT, there are two natural calamities that took a toll of over 100 persons' lives and three natural calamities that affected more than 50,000 people during the period from 1900 to 2012. 													
2. Administrative Division	<ul style="list-style-type: none"> The Independent State of Samoa is an island country in Oceania and a member state of the Commonwealth of Nations. It consists of seven small islands including Upolu and Savai'i. Its capital is located in the northern region of Upolu island. (The time zone was changed on December 31, 2011, thereby making Samoa one of the nations where the date changes at the earliest only during the daylight saving time. Samoa is comprised of eleven administrative divisions. 													
3. Disaster Mitigation & Preparedness • Identification of Disaster Risks (HFA2)	<ul style="list-style-type: none"> The disaster control measures in Oceania were started in the 1990s under the leadership of the USA and the UNDP and subsequently the National Disaster Management Headquarters were established. Disaster risks include storms, earthquakes, Tsunamis, high tides and floods. As to tsunami disasters, SOPAC finished to develop a water depth measurement system and a tsunami model in Tonga (2007) and in Solomon (2008), which gives a clue to the case of Samoa. 													
• Sharing Information on Disaster Risks with Community (HFA2)	<ul style="list-style-type: none"> Education on disaster preparedness was included in the curricula of primary and middle schools in 2009, and a manual is being prepared as to a school evacuation drill. It is reviewed so that it can be applied also to non-formal education. As regards community disaster education, a tsunami hazard map was made and a workshop was held at eight locations with assistance of the New Zealand Aid Programme (NZP). 													
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	<ul style="list-style-type: none"> The Disaster and Emergency Management Act was stipulated in 2007. The Samoa's National Action Plan for Disaster Risk Management 2011-2016 has been in force. The National Disaster Council (NDC) is the highest national decision-making organization. Under this organization, the Disaster Advisory Committee (DAC) has been established as a standing committee regardless of the occurrence of disaster, under which four sub-committees, i.e. Preparedness, Disaster Risk Reduction (DRR), Response, and Recovery, have been formed. 	【Issues】												
• Establishment and Enhancement of Disaster Management System (HFA1)	<p>The organizations in charge of disaster management are summarized below:</p> <table border="1"> <thead> <tr> <th>Disaster</th> <th>Prepared-ness</th> <th>Immediate response</th> <th>Rehabilitation /reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earthquake/ Tsunami</td> <td>Meteorology Division, Geology Section</td> <td>Action taken by the ministries/ agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center</td> <td>Ministries/ Agencies related to the affected facilities and regions</td> </tr> <tr> <td>Cyclone/ Flood</td> <td>Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency</td> <td>Same as the above</td> <td>Same as the above</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The Disaster Management Office (DMO), Ministry of Natural Resources and Environment works as Secretariat at the national level in each stage of preparedness, emergency response, and rehabilitation. 	Disaster	Prepared-ness	Immediate response	Rehabilitation /reconstruction	Earthquake/ Tsunami	Meteorology Division, Geology Section	Action taken by the ministries/ agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center	Ministries/ Agencies related to the affected facilities and regions	Cyclone/ Flood	Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency	Same as the above	Same as the above	<ul style="list-style-type: none"> It is expected that the problems held by the Samoa Meteorology Division such as a shortage of observation points and absence of upper air meteorological observations will be resolved by the Japan's environmental grant program. In the future, an issue is to build a network so that other countries within the region will be able to use Samoa's observation data. It is said that DMO is able to conduct administrative work concerning disaster management at normal times as well as at the time of disaster. The sizes of its staff and budget are too small in comparison to its work.
Disaster	Prepared-ness	Immediate response	Rehabilitation /reconstruction											
Earthquake/ Tsunami	Meteorology Division, Geology Section	Action taken by the ministries/ agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center	Ministries/ Agencies related to the affected facilities and regions											
Cyclone/ Flood	Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency	Same as the above	Same as the above											
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)	<ul style="list-style-type: none"> The Land Management Division, Ministry of Natural Resources and Environment is in charge of granting permission for the development of coastal areas, permission for collecting sand from seashores, and construction of coastal and river revetments. The Development Section accords permission for land use. There are no regulations as to setbacks in consideration for disasters and land use in consideration for disaster risks at seashores and rivers. It issues permissions for sand mining at seashores. The Project Section has been constructing revetments as erosion control measures of seashores and riverbanks. 	<ul style="list-style-type: none"> No structural measures have been taken due to a budgetary constraint. 												
• Development of Warning System and Evacuation System (HFA 2, 3)	<ul style="list-style-type: none"> The Meteorology Division monitors meteorological and tsunami information under the around-the-clock system. The Meteorology Division gives emergency information directly to media (radio and TV) without going through DMO. The modes of transmission are radio, TV and SMS. SMS is used by village heads, schoolmasters and pastors, and emergency information is sent to villagers with church bells, etc. The siren system has been installed at 23 locations along the coastline in 2009 with assistance of NZAP, thereby enabling to start the siren automatically to warn tsunamis through wireless operations at the office at Apia. 	<ul style="list-style-type: none"> SMS has not been widely used. Other organizations than the Meteorology Division do not work under the 24-hour system, and an emergency warning system has not been fully developed. Communication systems are poor. 												
• Financial Preparation (HFA1)	<ul style="list-style-type: none"> The largest part of the national budget is used for the fixed maintenance costs including salaries of public officials, and the fact of the matter is that funds for disaster management and rehabilitation come from assistance. An annual budget of the Meteorology Division: 52 million yen (in 2011). 													
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> At the time of disaster, the National Emergency Operation Center (NEOC) starts its operations with staff members who are sent from DMO and related ministries/agencies and coordinates disaster control activities under the command of NDC. It is planned to construct a new building for the NEOC with SOPAC assistance next year. 	<ul style="list-style-type: none"> SOP per local administrative unit has not been developed. 												
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> Disaster management activities are being conducted by aid organizations. 	<ul style="list-style-type: none"> Enhancement of the response capacity as to community-based disaster management 												
6. Climate Change Adaptation	<ul style="list-style-type: none"> The ADB programs are being implemented on climate change and disaster management. 													
7. Records of Major Assistance by JICA	< Grant Aid > Improvement Plan for Weather Observation and Disaster prevention (2009)													
8. Assistance Strategies and Records of other Development Partners	<p>AusAID</p> <ul style="list-style-type: none"> Public Sector Linkage Program for Risk Reduction In this program the Australian governmental organization provides opportunities to carry out development assistance activities in Oceanic nations and aims for developing the capacity of governmental organizations in Oceanic nations. <p>NZAP</p> <ul style="list-style-type: none"> Subsequent to the tsunami disasters in Tonga and Samoa in 2009, it implements the Pacific Tsunami Risk Management Project, which aims for strengthening the administrative capacity as to tsunami damage in each nation. NZAP, in cooperation with SOPAC, implemented Coordination of the Island Climate Update, a regional climate bulleting providing accurate and timely outlooks and projections in association with SPREP and SOPAC. ADB implemented the Pacific Climate Change Response and the Pacific Catastrophe Risk Assessment and Financing Initiative. 													
9. International Networking	<p>< Frameworks as to disaster control measures in Oceania ></p> <ul style="list-style-type: none"> The International Tsunami Information Centre (ITIC) was established in 1965 under the Intergovernmental Oceanographic Commission (IOC), a UNESCO-affiliated organization, and fulfills an important function towards reducing tsunami damage in each region. <p>< SOPAC: South Pacific Applied Geo-Science Commission ></p> <ul style="list-style-type: none"> Under the UN Department of Economic and Social Affairs, SOPAC, a regional framework, was established as an independent organization in 1982 by eighteen countries are sixteen South Pacific island nations plus Australia and New Zealand. Its headquarters are situated at Suva in Fiji. Its purpose lies in the conservation of natural resources in Oceania with wise practice. <p>< University of the South Pacific (USP) ></p> <ul style="list-style-type: none"> In 2011 the Disaster Risk Management course was opened. It performs the function as the disaster management research institute of the member states (jointly managed by the twelve Pacific nations). The course focuses on researches and training primarily as to natural disasters caused by climate change in Oceania. 													

Assistance to Challenge

Disaster Management in Samoa

Current Situation and Challenges	1.Features of Disasters	<ul style="list-style-type: none"> Samoa has a hot and humid tropical marine climate with an annual mean temperature of 26~27°C. It has a dry season (May ~ October) and a wet season (Nov. ~ April). Its yearly rainfall is 2,970mm at Apia. ^{*1} Its major disasters include cyclones, earthquakes and tsunamis, and high tides. According to EM-DAT, there are two natural calamities that took a toll of over 100 persons' lives and three natural calamities that affected more than 50,000 people during the period from 1900 to 2012. ^{*2} <p style="text-align: center;">Two major natural calamities that took the heaviest death toll between 1900 and 2012</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Cyclone</td> <td>June 13, 1964</td> <td>250</td> </tr> <tr> <td>Tsunami</td> <td>September 29, 2009</td> <td>143</td> </tr> </tbody> </table> <p style="text-align: center;">Natural calamities that affected more than 50,000 people between 1900 and 2012</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Cyclone</td> <td>February 1, 1990</td> <td>195,000</td> </tr> <tr> <td>Cyclone</td> <td>January 29, 1966</td> <td>95,000</td> </tr> <tr> <td>Cyclone</td> <td>December 7, 1991</td> <td>88,000</td> </tr> </tbody> </table>	Disaster	Date	Death toll	Cyclone	June 13, 1964	250	Tsunami	September 29, 2009	143	Disaster	Date	No. of victims	Cyclone	February 1, 1990	195,000	Cyclone	January 29, 1966	95,000	Cyclone	December 7, 1991	88,000
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2.Administrative Division	<ul style="list-style-type: none"> The Independent State of Samoa is an island country in Oceania and a member state of the Commonwealth of Nations. It consists of seven small islands including Upolu and Savai'i. Its capital is located in the northern region of Upolu island. (The time zone was changed on December 31, 2011, thereby making Samoa one of the nations where the date changes at the earliest only during the daylight saving time. Samoa is comprised of eleven administrative divisions. ^{*1} 																						
3. Disaster Mitigation & Preparedness	<p>【Current situation】</p> <ul style="list-style-type: none"> The disaster control measures in Oceania was started in the 1990s under the leadership of the USA and the UNDP and subsequently the National Disaster Management Headquarters were established. <p>【Issue】</p> <ul style="list-style-type: none"> Apia, capital, will have an increasing need of cyclone and flood control measures in parallel with its urbanization. It is desired to unify the organizations in charge as well. 																						
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) Sharing Information on Disaster Risks with Community (HFA2) Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) ^{*3} 	<ul style="list-style-type: none"> As to tsunami disasters, SOPAC finished to develop a water depth measurement system and a tsunami model in Tonga (2007) and in Solomon (2008), which gives a clue to the case of Samoa. Disaster risks include storms, earthquakes, tsunamis, and floods. Education on disaster preparedness was included in the curricula of primary and middle schools in 2009, and a manual is being prepared as to a school evacuation drill. It is reviewed so that it can be applied also to non-formal education. As regards community disaster education, a tsunami hazard map was made and a workshop was held at eight locations with assistance of the New Zealand Aid Programme (NZP). The Disaster and Emergency Management Act was stipulated in 2007. The Samoa's National Action Plan for Disaster Risk Management 2011-2016 has been in force. The National Disaster Council (NDC) is the highest national decision-making organization. Under this organization, the Disaster Advisory Committee (DAC) has been established as a standing committee regardless of the occurrence of disaster, under which four sub-committees, i.e. Preparedness, Disaster Risk Reduction (DRR), Response, and Recovery, have been formed. The Disaster Management Office, Ministry Natural Resources and Environment, is established as the Secretariat of these national level organizations. The following Disaster Management Plans for cyclones and tsunamis have been completed. <ol style="list-style-type: none"> 1)Samoa National Tropical Cyclone Plan 2006 2)Samoa National Tsunami Plan, 2006 (reviewed on 2008) The Standard Operating Procedure (SOP) has been developed at 																						

<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<p>the Meteorology Division as to a cyclone warning system and a tsunami alerts and warning procedure.</p>	<ul style="list-style-type: none"> It is expected that the problems held by the Samoa Meteorology Division such as a shortage of observation points and absence of upper air meteorological observations will be resolved by the Japan's environmental grant program . In the future, an issue is to build a network so that other countries within the region will be able to use Samoa's observation data. It is said that DMO is able to conduct administrative work concerning disaster management at normal times as well as at the time of disaster. The sizes of its staff and budget are too small in comparison to its work. The broadcasting equipment of state-run broadcasting station 2AP has not been renewed. That is, it is run without a backup site and equipment. 												
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3 	<p><Disaster management organizations in charge> The organizations in charge of disaster management are summarized below:</p> <table border="1"> <thead> <tr> <th>Disaster</th> <th>Preparedness</th> <th>Immediate response</th> <th>Rehabilitation /reconstruction</th> </tr> </thead> <tbody> <tr> <td>Earthquake/ Tsunami</td> <td>Meteorology Division, Geology Section</td> <td>Action taken by the ministries/agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center</td> <td>Ministries/ Agencies related to the affected facilities and regions</td> </tr> <tr> <td>Cyclone/ Flood</td> <td>Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency</td> <td>Same as the above</td> <td>Same as the above</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The Disaster Management Office (DMO), Ministry of Natural Resources and Environment works as Secretariat at the national level in each stage of preparedness, emergency response, and rehabilitation. It has a regular staff of three, but the National Emergency Operation Center will be formed at the time of disaster and fulfill the central role in coordination and management together with staff members of related ministries/agencies at the Center. Mobile phone networks have been developed to cover all the islands. The number of registered cell phones is 91.3 per hundred persons. Thus, the popularization rate is high. There are three active TV stations, but radio is in the mainstream. NEMO uses the ALERT System that has been developed as a system to collect information and transmit it to community residents at the time of disaster. It has been building a system combined with a mechanism for information collection using cell phone networks and a siren warning system (that covers the entire southern region of the main island) The Land Management Division, Ministry of Natural Resources and Environment is in charge of granting permission for the development of coastal areas, permission for collecting sand from seashores, and construction of coastal and river revetments. The Development Section accords permission for land use. There are no regulations as to setbacks in consideration for disasters and land use in consideration for disaster risks at seashores and rivers. It issues permissions for sand mining at seashores. The Project Section has been constructing revetments as erosion control measures of seashores and riverbanks. 	Disaster	Preparedness	Immediate response	Rehabilitation /reconstruction	Earthquake/ Tsunami	Meteorology Division, Geology Section	Action taken by the ministries/agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center	Ministries/ Agencies related to the affected facilities and regions	Cyclone/ Flood	Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency	Same as the above	Same as the above	<ul style="list-style-type: none"> It is foreseen that the city of Apia will be faced with an increasing importance of flood-control measures as the size and frequency of flood damage will grow amidst progressive development of Apia, particularly in the upper reaches. The storm surge caused by cyclones also poses a problem. What is required in granting permission for land use is to stipulate regulations that consider disasters in coastal regions and rivers.
Disaster	Preparedness	Immediate response	Rehabilitation /reconstruction											
Earthquake/ Tsunami	Meteorology Division, Geology Section	Action taken by the ministries/agencies related to the affected facilities and regions under the supervision of National Emergency Operation Center	Ministries/ Agencies related to the affected facilities and regions											
Cyclone/ Flood	Meteorology Division, Weather Forecasting, Land Management Division, Planning and urban Management Agency	Same as the above	Same as the above											
<ul style="list-style-type: none"> Development of 	<ul style="list-style-type: none"> The Meteorology Division monitors meteorological and tsunami 	<ul style="list-style-type: none"> Capacity building of DMO staff 												

	Warning System and Evacuation System (HFA2,3) *3	<p>information under the around-the-clock system. The Meteorology Division gives emergency information directly to media (radio and TV) without going through DMO. The modes of transmission are radio, TV and SMS. SMS is used by village heads, schoolmasters and pastors, and emergency information is sent to villagers with church bells, etc.</p> <ul style="list-style-type: none"> The siren system has been installed at 23 locations along the coastline in 2009 with assistance of NZAP, thereby enabling to start the siren automatically to warn tsunamis though wireless operations at the office at Apia. 	<ul style="list-style-type: none"> Necessity of improving the modes of transmission Insufficiency particularly in the modes of speedy information transmission to local areas A shortage of observation points, thereby not enabling Samoa to identify the epicenter and intensity A hazard map has not been developed. 																																				
	<ul style="list-style-type: none"> Financial Preparation (HFA1) *3 	<ul style="list-style-type: none"> The largest part of the national budget is used for the fixed maintenance costs including salaries of public officials, and the fact of the matter is that funds for disaster management and rehabilitation come from assistance. An annual budget of the Meteorology Division: 52 million yen (in 2011). 	<ul style="list-style-type: none"> There is little hope of budgetary expansion. It is needed to think about disaster management and disaster-related projects predicated on constant assistance. 																																				
	<p>4. Emergency Response (HFA5) *3</p> <ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	<p>【Current situation】</p> <ul style="list-style-type: none"> At the time of disaster, the National Emergency Operation Center (NEOC) starts its operations with staff members who are sent from DMO and related ministries/agencies and coordinates disaster control activities under the command of NDC. It is planned to construct a new building for the NEOC with SOPAC assistance next year. 	<p>【Issue】</p> <ul style="list-style-type: none"> SOP per local administrative unit has not been developed. 																																				
	<p>5. Policy on Community-based Disaster Management *3</p>	<ul style="list-style-type: none"> Disaster management activities are being conducted by aid organizations. 	<ul style="list-style-type: none"> Enhancement of the response capacity as to community-based disaster management 																																				
	<p>6. Climate Change Adaptation</p>	<ul style="list-style-type: none"> The ADB programs are being implemented on climate change and disaster management. 																																					
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<p>8. Assistance Strategies and Records of other Development Partners</p>	<p><u>AusAID</u> Public Sector Linkage Program for Risk Reduction In this program the Australian governmental organization provides opportunities to carry out development assistance activities in Oceanic nations and aims for developing the capacity of governmental organizations in Oceanic nations.</p> <p><u>NZAP</u> Subsequent to the tsunami disasters in Tonga and Samoa in 2009, it implements the Pacific Tsunami Risk Management Project, which aims for strengthening the administrative capacity as to tsunami damage in each nation.</p> <ul style="list-style-type: none"> NZAP, in cooperation with SOPAC, implemented Coordination of the Island Climate Update, a regional climate bulleting providing accurate and timely outlooks and projections in association with SPREP and SOPAC. ADB implemented the Pacific Climate Change Response and the Pacific Catastrophe Risk Assessment and Financing Initiative. 																																						

9.International Networking	<p>< Frameworks as to disaster control measures in Oceania ></p> <ul style="list-style-type: none"> • The International Tsunami Information Centre(ITIC) was established in 1965 under the Intergovernmental Oceanographic Commission(IOC), a UNESCO-affiliated organization, and fulfills an important function towards reducing tsunami damage in each region. <p>< SOPAC: South Pacific Applied Geo-Science Commission ></p> <ul style="list-style-type: none"> • Under the UN Department of Economic and Social Affairs, SOPAC, a regional framework, was established as an independent organization in 1982 by eighteen countries composed of sixteen South Pacific island nations plus Australia and New Zealand. Its headquarter is situated at Suva in Fiji. Its purpose lies in the conservation of natural resources in Oceania with wise practice. <p>< University of the South Pacific (USP) ></p> <ul style="list-style-type: none"> • In 2011 the Disaster Risk Management course was opened. It performs the function as the disaster management research institute of the member states (jointly managed by the twelve Pacific nations). • The course focuses on researches and training primarily as to natural disasters caused by climate change in Oceania.
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- Source :
- *1 Web-site (ja.wikipedia.org)
 - *2 Web-site (www.emdat.be)
 - *3 Samoa's National Action Plan for Disaster Risk Management (2011-2016)
 - *4 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010) (http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)
- Note: About items without the mark of reference number, it is based on the following report prepared in April, 2012.
JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

Appendix 7

Inventory on Disaster Management in Nauru

Disaster Management in Nauru (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Nauru is comprised of Nauru Island (with an area of 21 km²). It has a population of approximately 10,000 persons. It has a tropical rainforest climate with the average temperature of 27.9°C in January and 27.8°C in July. Its annual precipitation is 1,994mm. Its disaster risk is tsunami. According to EM-DAT, there are no records of natural calamities that inflicted serious damage between 1900 and 2012. 	
2. Administrative Division	<ul style="list-style-type: none"> The country is divided into 14 administrative divisions, Neneng, Boe, Yaren, Buada, Aiwo, Nibok, Baiti, Uaboe, Anetan, Ewa, Anabar, Denigomodu, Ijuw, and Anibare, 	
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> Disaster risk is the damage caused by tsunamis. 	
• Identification of Disaster Risks (HFA2)		
• Sharing Information on Disaster Risks with Community (HFA2)		
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	<ul style="list-style-type: none"> Disaster Risk Management Act (2008) Nauru Disaster Risk Plan (2008) 	【Issues】
• Establishment and Enhancement of Disaster Management System (HFA1)	<ul style="list-style-type: none"> The National Disaster Risk Management Council (NDRMC) maps up policy plans. NDRMC receives advice from two committees, Recovery Advisory Committee and Mitigation and Preparedness Advisory Committee. 	
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)		
• Development of Warning System and Evacuation System (HFA 2, 3)		
• Financial Preparation (HFA1)		
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> The National Controller shall coordinate emergency activities when a “disaster” has been declared. 	
5. Policy on Community-based Disaster Management		
6. Climate Change Adaptation	<ul style="list-style-type: none"> The Pacific Climate Change Science Program (2011) predicts that the sea level will rise by 10~30m in 2055 and 20~57cm in 2090 in the medium emission scenario. The Pacific Plan and the Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated as disaster mitigation programs by SOPAC. *5 SPC, SOPAC: Strategic Plan 2011-2015. 	
7. Records of Major Assistance by JICA	<p>< Technical cooperation project > Strengthen Weather Forecasting Capability and Formulation of Network System (2009) < Country-and issue based training > The Third Country Training on Weather in the Pacific (2010-2012)</p>	
8. Assistance Strategies and Records of other Development Partners	EU has been implementing region-wide projects as to climate change and disaster risk reduction. Its main projects are, 1) Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (SPC) 2) Disaster Risk Reduction in (Pacific ACP States, SOPAC)	
9. International Networking		

Disaster Management in Nauru

Current Situation and Challenges	1.Features of Disasters	<ul style="list-style-type: none"> • Nauru is comprised of Nauru Island (with an area of 21 km²). It has a population of approximately 10,000 persons.*1 • It has a tropical rainforest climate with the average temperature of 27.9°C in January and 27.8°C in July. Its annual precipitation is 1,994mm.*1 • Its disaster risk is tsunami. • According to EM-DAT, there are no records of natural calamities that inflicted serious damage between 1900 and 2012. *2 	
	2.Administrative Division	The country is divided into 14 administrative divisions, Neneng, Boe, Yaren, Buada, Aiwo, Nibok, Baiti, Uaboe, Anetan, Ewa, Anabar, Denigomodu, Ijuw, and Anibare,	
	3. Disaster Mitigation & Preparedness	【Current situation】	【Issue】
	• Identification of Disaster Risks (HFA2)	• Disaster risk is the damage caused by tsunamis.	•
	• Sharing Information on Disaster Risks with Community (HFA2)		
	• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) *3	<ul style="list-style-type: none"> • Disaster Risk Management Act (2008) • Nauru Disaster Risk Plan (2008) 	
	• Establishment and Enhancement of Disaster Management System (HFA1) *3	<ul style="list-style-type: none"> • The National Disaster Risk Management Council (NDRMC) maps up policy plans. • NDRMC receives advice from two committees, Recovery Advisory Committee and Mitigation and Preparedness Advisory Committee. 	
	• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3		
	• Development of Warning System and Evacuation System (HFA2,3) *3		
	• Financial Preparation (HFA1) *3		
4.Emergency Response (HFA5) *3	【Current situation】	【Issue】	
• Establishment of emergency response system	• The National Controller shall coordinate emergency activities when a “disaster” has been declared.	•	
• Lifesaving			
• Helping affected people			
5.Policy on Community-based Disaster Management*3		•	
6. Climate Change Adaptation *4,*5	<ul style="list-style-type: none"> • The Pacific Climate Change Science Program (2011) predicts that the sea level will rise by 10~30m in 2055 and 20~57cm in 2090 in the medium emission scenario. • The Pacific Plan and the Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated as disaster mitigation programs by SOPAC. *5 		

Assistance to Challenge	7. Records of Major Assistance by JICA*6	<p>• SPC,SOPAC: Strategic Plan 2011-2015 *5</p> <p>< Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>< Technical cooperation project ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Strengthen Weather Forecasting Capability and Formulation of Network System</td> <td>2009</td> <td>2009</td> </tr> </tbody> </table> <p>< Equipment provision ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>< Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>The Third Country Training on Weather in the Pacific</td> <td>2010</td> <td>2012</td> </tr> </tbody> </table> <p>< Grant Aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>< Grant aid for grassroots activities ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Project	Year started	Year ended				Project	Year started	Year ended	Strengthen Weather Forecasting Capability and Formulation of Network System	2009	2009	Project	Year started	Year ended				Project	Year started	Year ended	The Third Country Training on Weather in the Pacific	2010	2012	Project	Year implemented	Amount				Project	Year started	Year ended			
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8.Assistance Strategies and Records of other Development Partners *5	<p>EU has been implementing region-wide projects as to climate change and disaster risk reduction. Its main projects are,</p> <p>1)Increasing Climate Resilience of Pacific Small Islands States thorough the Global Climate Change Alliance (SPC)</p> <p>2)Disaster Risk Reduction in (Pacific ACP States, SOPAC)</p>																																					
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Source:

*1 Website (ja.wikipedia.org)

*2 Website (www.emdat.be)

*3 Nauru National Disaster Management Plan (May. 2008)

*4 Nauru Department of Commerce: Industry and Environment: Pacific Climate Change Science Program (2011)

*5 JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

*6 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)

(http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)

Appendix 8

Inventory on Disaster Management in Tuvalu

Disaster Management in Tuvalu (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Tuvalu comprises four reef islands and five true atolls. Its islands form a 700-kilometer volcanic arc and the major ones keep a distance of 125 kilometers to 150 kilometers from one another. The scattered group of islands has poor soil and a total land area of only about 26 square kilometers, making Tuvalu the fourth smallest country in the world. The highest elevation is 4.5 meters above sea level in the entire Tuvalu. There is very little land whose elevation is above 3 meters. The whole population (9,700 persons) is centered on its tiny islands. The entire country is very vulnerable to hydrographic conditions and meteorological disasters, because there are no heights for evacuation. Tuvalu has suffered a number of disasters, such as cyclones, floods, drought and rising sea levels. Its land is flat with no slopes and away from the Circum-Pacific earthquake zone. Therefore, there are no terrestrial disasters like earthquakes and volcanic activities. Although there have been no records on damages directly caused by earthquakes, no one can say that there would be no possibilities of tremors in the future. There are no records on natural disasters, which cost the lives of more than ten people between 1900 and 2012. There are three natural disasters whose victims amounted to more than 100 persons between 1900 and 2012. 	
2. Administrative Division	<ul style="list-style-type: none"> The country does not employ the system of administrative divisions, because of its small population. 	
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> Disaster risks include tsunamis and cyclones. 	
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 	<ul style="list-style-type: none"> In December, 1997, a new community organization was formed in Tuvalu. The authorization to run the communities was transferred to Falekaupule, the traditional decision making body which had led the communities, and its administrative body, Kaupule. The central government shares information with each community through Kaupule. 	
<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> The 1987 National Disaster Plan was revised and the Disaster Management Act (Revised Edition) was formulated and enacted in 2008. 	【Issues】
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> Tuvalu's disaster management system is as follows. <ol style="list-style-type: none"> National Disaster Committee Formed by the central government agencies and implementing disaster responses. Island Disaster Committee at each island level Placed under the National Disaster Committee and implementing disaster responses on each island. Disaster management room in the Prime Minister's office Having Disaster Coordinators and coordinating communications with disaster prevention-related institutions. 	
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<ul style="list-style-type: none"> As a part of the adaptation measure, the government of Tuvalu has asked for supports from aid agencies, in order to build levees and breakwaters, which protect its coasts. However, very few of the bank protection works around the coral islands have been carried out, in the light of the economy, technology and environmental protection. Under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC), in 2007, Tuvalu developed the action plan totaling approximately eight million dollars, including projects to strengthen the resilience against rising sea levels along the coasts and in the communities, to introduce taro resistant to seawater damages and to ensure water. Since then, it has received financial support. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	<ul style="list-style-type: none"> The disaster prevention agency in the Prime Minister's office is charged with the administration of disaster prevention. It provides meteorological/disaster information to the nation, when a cyclone occurs, and also provides tidal information obtained by monitoring the rising sea levels caused by climate change. Tuvalu's meteorological bureau obtains meteorological data from New Zealand. No seismometers are set up. Tsunami warning is issued directly to the residents, upon receipt of information from the Pacific Tsunami Warning Center in Hawaii. In response to the requests from the countries in the South Pacific, the South Pacific Sea Level and Climate Monitoring Project (SPSLCMP) was launched by Australia in 1991, in order to scientifically examine the actual effects of rising sea levels. In 1993, installed was the sea level and meteorological equipment of high precision, named SEAFRAME, in Funafuti. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> Tuvalu is a member of the Alliance of Small Island States (AOSIS), being recognized as one of the Least Developed Countries (LDC). Therefore, it has formulated its action plan (NAPA; National Adaptation Programmes of Action) and received financial aid. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Financial Preparation (HFA1) 		
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> NAPA includes an emergency response plan for all the residents. 	<ul style="list-style-type: none"> As the United Nations defines it as a Least Developed Country, Tuvalu has no economic and technological powers to deal with the damages caused by climate change.
5. Policy on Community-based Disaster Management	<ul style="list-style-type: none"> The National Adaptation Programme of Action (NAPA) is committed to increasing disaster prevention abilities in the communities and raising the residents' awareness of disaster prevention. The educational programs of disaster prevention are provided to the residents and the students in school by TANGO, etc. However, the opportunities, which allow the residents to obtain correct knowledge on disaster prevention, are limited, due to the shortage of the media. Furthermore, educational materials for disaster prevention should be translated into the Tuvaluan language and distributed in that language. If not, they would become less effective. 	<ul style="list-style-type: none">
6. Climate Change Adaptation	<ul style="list-style-type: none"> Tuvalu has come up with the National Adaptation Programme of Action (NAPA), as a part of the comprehensive strategy to respond to global warming. In the light of the current situation of the damages in Tuvalu and its future prospects, the government thinks that Tuvalu's environmental refugees need international assistance measures. We have discussed whether the problems can be solved within the pre-existing framework. There are three types of measures: the "international agreement on climate change" as an environmental measure, the "National Adaptation Programme of Action (NAPA)" as an adaptation measure and the "Pacific Access Category (PAC)" as an immigration measure, which has been agreed with the government of New Zealand. 	
7. Records of Major Assistance by JICA	<p>< Development Research > Study on Ecosystem Evaluation, and Seashore Protection and Revival Plan (2009)</p> <p>< Technical cooperation project > (Science Technology) Ecological Engineering Maintenance for Raising of Sea Level in Tuvalu (2009-2014)</p>	
8. Assistance Strategies and Records of other Development Partners	<p><u>AusAID</u></p> <ul style="list-style-type: none"> Set up the bureau of climate change inside itself and plans to provide assistance for the climate change countermeasures. Developed the Economic Impact of the Disaster Programme, providing financial support to the University of the South Pacific. <p><u>SOPAC/SPC</u></p> <ul style="list-style-type: none"> Came up with the disaster risk management program. Tuvalu is a member of AOSIS, being recognized as one of the LDCs. Therefore, it has formulated NAPA and received financial aid for its adaptation measure. 	
9. International Networking		

Disaster Management in Tuvalu

Current Situation and Challenges	1.Feature of Disasters	<ul style="list-style-type: none"> Tuvalu comprises four reef islands and five true atolls. Its islands form a 700-kilometer volcanic arc and the major ones keep a distance of 125 kilometers to 150 kilometers from one another. The scattered group of islands has poor soil and a total land area of only about 26 square kilometers, making Tuvalu the fourth smallest country in the world. The highest elevation is 4.5 meters above sea level in the entire Tuvalu. There is very little land whose elevation is above 3 meters.*3 The whole population (9,700 persons) is centered on its tiny islands. The entire country is very vulnerable to hydrographic conditions and meteorological disasters, because there are no heights for evacuation. Tuvalu has suffered a number of disasters, such as cyclones, floods, drought and rising sea levels.*5 Its land is flat with no slopes and away from the Circum-Pacific earthquake zone. Therefore, there are no terrestrial disasters like earthquakes and volcanic activities. Although there have been no records on damages directly caused by earthquakes, no one can say that there would be no possibilities of tremors in the future. There are no records on natural disasters, which cost the lives of more than ten people between 1900 and 2012. There are three natural disasters whose victims amounted to more than 100 persons between 1900 and 2012.*2 <p style="text-align: center;">The largest natural disaster (in terms of death toll) between 1900 and 2012*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>October 21, 1972</td> <td>6</td> </tr> </tbody> </table> <p style="text-align: center;">Major natural disasters with over 100 victims between 1900 and 2012*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th># of victims</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>October 21, 1972</td> <td>700</td> </tr> <tr> <td>Storm</td> <td>February 4, 1990</td> <td>700</td> </tr> <tr> <td>Storm</td> <td>June 3, 1993</td> <td>150</td> </tr> </tbody> </table>		Disaster	Date	Death toll	Storm	October 21, 1972	6	Disaster	Date	# of victims	Storm	October 21, 1972	700	Storm	February 4, 1990	700	Storm	June 3, 1993	150
	Disaster	Date	Death toll																		
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Storm	October 21, 1972	700																			
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Storm	June 3, 1993	150																			
2.Administrative Division	The country does not employ the system of administrative divisions, because of its small population.																				
3. Disaster Mitigation & Preparedness	【Current situation】	【Issues】																			
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) Sharing Information on Disaster Risks with Community (HFA2) Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> Disaster risks include tsunamis and storms as well as cyclones. There are no reports on disaster risk information such as hazard maps. It is assumed that no hazard maps and localized disaster information material, have not been prepared, because most of the disasters are caused by meteorological or hydrographic conditions, which damage the entire country. Since its total land mass is 26 square kilometers, the inhabitants on each island understand what is happening where. In December, 1997, a new community organization was formed in Tuvalu. The authorization to run the communities was transferred to <i>Falekaupule</i>, the traditional decision making body which had led the communities, and its administrative body, <i>Kaupule</i>. The central government shares information with each community through <i>Kaupule</i>.*5 The 1987 National Disaster Plan was revised and the Disaster Management Act (Revised Edition) was formulated and enacted in 2008.*9 *11 *12 Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (SPREP/SPC) *9 Tuvalu National Tsunami Law (Draft) *9 As countermeasures against climate change, there are two types: an easing measure to stop climate change and an adaptation measure to reduce its effects. Tuvalu regards climate change (global warming) as the biggest source causing disasters in the country. It has reviewed a number of adaptation measures, while it has called on the international organizations, etc. to reduce the emissions of green house gases for a long term, as an easing measure. Tuvalu has come up with the National Adaptation Programme of Action (NAPA), as a part of the comprehensive strategy to respond to global warming. Its basic policies are as follows.*1 <ol style="list-style-type: none"> Formulating an emergency response plan for all the residents. 	<ul style="list-style-type: none"> Research institutes in the world have tried to scientifically clarify, whether shore erosions and floods, etc. which happen in Tuvalu are caused by climate change. However, it will take a long time to achieve a conclusion. Some point to increasing environmental burdens along with population growth and the expansion of the residential areas, as major sources of shore erosions and floods which have happened in Tuvalu.*6 NAPA is a plan to obtain supports from the external organizations, in order to cope with climate change, rather than a disaster prevention plan. 																			

	<ul style="list-style-type: none"> 2) Implementing urgent and early actions to cope with climate change. 3) Improving the lives of the residents and raising their awareness. 4) Integrating the adaptation plan into the other plans of the central government and each organization. • Tuvalu has been concerned about its future in which each of the islands would become inhabitable, due to the rising sea levels. It aims at immigrating all the population into the other countries in the next thirty years or so, and called on Australia and New Zealand to accept its nationals as environmental refugees. The government of New Zealand has accepted 75 persons each year since 2003, developing the immigration program, (PAC; The Pacific Access Category).*3 	<ul style="list-style-type: none"> • Although NAPA has been a little effective, it has not completely prevented the creation of environmental refuges. Thus, it became necessary to consider assistance measures relating to environmental refugees.
<ul style="list-style-type: none"> • Establishment and Enhancement of Disaster Management System (HFA1) 	<ul style="list-style-type: none"> • Tuvalu’s disaster management system is as follows. <ul style="list-style-type: none"> 1)National Disaster Committee Formed by the central government agencies and implementing disaster responses. 2)Island Disaster Committee at each island level Placed under the National Disaster Committee and implementing disaster responses on each island. 3)Disaster management room in the Prime Minister’s office Having Disaster Coordinators and coordinating communications with disaster prevention-related institutions.*8 	
<ul style="list-style-type: none"> • Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3 	<ul style="list-style-type: none"> • As a part of the adaptation measure, the government of Tuvalu has asked for supports from aid agencies, in order to build levees and breakwaters, which protect its coasts. However, very few of the bank protection works around the coral islands have been carried out, in the light of the economy, technology and environmental protection.*6 • Under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC), in 2007, Tuvalu developed the action plan totaling approximately eight million dollars, including projects to strengthen the resilience against rising sea levels along the coasts and in the communities, to introduce taro resistant to seawater damages and to ensure water. Since then, it has received financial support.* 3 	
<ul style="list-style-type: none"> • Development of Warning System and Evacuation System (HFA2,3) *3 	<ul style="list-style-type: none"> • The disaster prevention agency in the Prime Minister’s office is charged with the administration of disaster prevention. It provides meteorological/disaster information to the nation, when a cyclone occurs, and also provides tidal information obtained by monitoring the rising sea levels caused by climate change. The information is distributed in the order of 1)Meteorological center → 2)Disaster prevention agency → 3)IDC&TMD → 4)Residents.*7 • Tuvalu’s meteorological bureau obtains meteorological data from New Zealand. • No seismometers are set up. Tsunami warning is issued directly to the residents, upon receipt of information from the Pacific Tsunami Warning Center in Hawaii, the United States. • In response to the requests from the countries in the South Pacific, the South Pacific Sea Level and Climate Monitoring Project (SPSLCMP) was launched by Australia in 1991, in order to scientifically examine the actual effects of rising sea levels. In 1993, installed was the sea level and meteorological equipment of high precision, named SEAFRAME, in Funafuti.*3 	
<ul style="list-style-type: none"> • Financial Preparation (HFA1) *3 	<ul style="list-style-type: none"> • Tuvalu is a member of the Alliance of Small Island States (AOSIS), being recognized as one of the Least Developed Countries (LDC). Therefore, it has formulated its action plan (NAPA; National Adaptation Programmes of Action) and received financial aid. • NAPA lays out the overview of the emergency/early adaptation measure and its priorities, which are developed while receiving 	<ul style="list-style-type: none"> • As the United Nations defines it as a Least Developed Country, Tuvalu has no economic and technological powers to deal with the damages caused by climate change.

	financial assistance.																																						
4. Emergency Response (HFA5) *3	<ul style="list-style-type: none"> • NAPA includes an emergency response plan for all the residents. 	•																																					
<ul style="list-style-type: none"> • Establishment of emergency response system • Lifesaving • Helping affected people 																																							
5. Policy on Community-based Disaster Management*3	<ul style="list-style-type: none"> • The National Adaptation Programme of Action (NAPA) is committed to increasing disaster prevention abilities in the communities and raising the residents' awareness of disaster prevention.*8 • The educational programs of disaster prevention are provided to the residents and the students in school by TANGO, etc. However, the opportunities, which allow the residents to obtain correct knowledge on disaster prevention, are limited, due to the shortage of the media. Furthermore, educational materials for disaster prevention should be translated into the Tuvaluan language and distributed in that language. If not, they would become less effective.*8 																																						
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Assistance to Challenge	7. Records of Major Assistance by JICA	<p><Development Research >*9</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Study on Ecosystem Evaluation, and Seashore Protection and Revival Plan</td> <td>2009</td> <td>2009</td> </tr> </tbody> </table> <p><Technical cooperation project></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>(Science Technology) Ecological Engineering Maintenance for Raising of Sea Level in Tuvalu</td> <td>2009</td> <td>2014</td> </tr> </tbody> </table> <p><Equipment provision></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Country-and issue based training></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant Aid></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant aid for grassroots activities>*9</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Project	Year started	Year ended	Study on Ecosystem Evaluation, and Seashore Protection and Revival Plan	2009	2009	Project	Year started	Year ended	(Science Technology) Ecological Engineering Maintenance for Raising of Sea Level in Tuvalu	2009	2014	Project	Year started	Year ended				Project	Year started	Year ended				Project	Year implemented	Amount				Project	Year started	Year ended				
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8. Assistance Strategies and Records of other Development Partners	<p><u>AusAID</u></p> <ul style="list-style-type: none"> • Set up the bureau of climate change inside itself and plans to provide assistance for the climate change countermeasures. • Developed the Economic Impact of the Disaster Programme, providing financial support to the University of the South Pacific.*8 <p><u>SOPAC/SPC</u></p> <ul style="list-style-type: none"> • Came up with the disaster risk management program.*8 • Tuvalu is a member of AOSIS, being recognized as one of the LDCs. Therefore, it has formulated NAPA and received financial aid for its adaptation measure. In comparison with the size of the country (population: about one million persons), it has received large-scale supports from a large number of donors. Thus, there have been mutual concerns among the donors, such as its ability to absorb each support and policy making/human resources, which allow each support to be implemented smoothly.*8 																																						
9. International Networking		•																																					

- Source :
- *1 International Federation of Red cross and Red crescent Societies, [www. Climatecentre.org](http://www.climatecentre.org) (2008)
 - *2 EM-DAT: The OFDA/CRED International Disaster Database, Universite Catholique de Louvain – Brussels
(<http://www.emdat.be>) (accessed on 15 April, 2012)
 - *3 Wikipedia: (<http://en.wikipedia.org/wiki/Tuvalu>) (March, 2012)
 - *4 UNISDR: Preventionweb,(<http://www.preventionweb.net/english/>) (accessed on 25January 2010)
 - *5 Ministry of Natural Resources, Environment, Agriculture and Lands; Tuvalu’s National Adaptation Programme of Action (2007)
 - *6 Chiba University of Commerce: Global Warming and Real image of Tuvalu (2008), Special-feature GP Surveillance Study
 - *7 JICA: Study Report on Disaster Prevention Improvement Plan by Middle-wave Radio Network in Tuvalu (Extract)
 - *8 JICA: Study Report on Project Formulation for Climate Change Adaptation Disaster in Tuvalu (2008)
 - *9 JICA: Questionnaire for Data Collection Survey on Disaster Management in the Pacific / Tuvalu (2012)
 - *10 Country Partnership Strategy-Tuvalu 2008 / ADB
 - *11 Tuvalu National Disaster Plan 1997
 - *12 Tuvalu National Disaster Management Act 2008 Revised Edition

Appendix 9

Inventory on Disaster Management in Niue

Disaster Management in Niue (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Niue is an island with its land area of 259km², whose population is about 1,600. Its climate is categorized into savanna. The average temperature is 24 °C from April to November, 29°C from December to March. Annual rainfall is 2,180mm. The natural disaster risks may come with cyclones and tsunami. According to EM-DAT, there is only one case of natural disaster involving human victims between 1900 and 2012. There are three natural disasters, involving more than 500 human victims between 1900 and 2012.
2. Administrative Division	<ul style="list-style-type: none"> Niue belongs to Free Confederation of New Zealand. The country does not employ the system of administrative divisions.
3. Disaster Mitigation & Preparedness	<p>Disaster risks include tsunamis and cyclones.</p> <p>Public Emergency Act (1979) National Disaster Relief Fund Act (1980) Public Emergency Regulation (2004) Niue National Disaster Plan (2010)</p> <p>National Disaster Council (NDC) effectively exercises strategy management of disaster. Police Emergency Management Officer (PEMO) performs major tasks under the control of NDC.</p> <p>As for tsunami, in the current system, Telecom receives messages from PTWC.</p> <p>No system has been installed.</p>
• Identification of Disaster Risks (HFA2)	
• Sharing Information on Disaster Risks with Community (HFA2)	
• Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)	
• Establishment and Enhancement of Disaster Management System (HFA1)	
• Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)	
• Development of Warning System and Evacuation System (HFA 2, 3)	
• Financial Preparation (HFA1)	
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> Emergency Executive Group (EEG) carries out emergency activities as well as coordination under the National Emergency Operation Center (NEOC).
5. Policy on Community-based Disaster Management	
6. Climate Change Adaptation	<ul style="list-style-type: none"> As part of Niue National Climate Change Policy (2009), SPREP and SOPAC have been asked to carry out the concerned research. As part of Disaster Mitigation program of SOPAC, Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015 has been planned. SPC, SOPAC: Strategic Plan 2011-2015
7. Records of Major Assistance by JICA	<p>< Technical cooperation project > Strengthen Capability for Weather Forecasting and Formulation of Network (2009)</p>
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> NZAP implements several projects on tsunami covering a wide area. Principal ones are as follows: 1) Pacific Tsunami Risk Management Project The following are projects involving cooperation with EU. 1) Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (SPC)
9. International Networking	

Disaster Management in Niue

Current situation and Challenges	1.Features of Disasters	<ul style="list-style-type: none"> Niue is an island with its land area of 259km², whose population is about 1,600. *1 Its climate is categorized into savanna. The average temperature is 24 °C from April to November, 29°C from December to March. Annual rainfall is 2,180mm. *2 The natural disaster risks may come with storms and tsunami. According to EM-DAT, there is only one case of natural disaster involving human victims between 1900 and 2012. *3 There are three natural disasters, involving more than 500 human victims between 1900 and 2012. *2 <p style="text-align: center;">Natural disasters between 1900 and 2012 that involved human deaths</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date of disaster</th> <th>Number of death</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>January 6th 2004</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">Natural disasters between 1900 and 2012 that involved more than 500 human victims</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date of disaster</th> <th>Number of victims</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>January 18th 1960</td> <td>4,000</td> </tr> <tr> <td>Storm</td> <td>February 26th 1959</td> <td>1,600</td> </tr> <tr> <td>Storm</td> <td>January 6th 2004</td> <td>702</td> </tr> </tbody> </table>		Disaster	Date of disaster	Number of death	Storm	January 6 th 2004	1	Disaster	Date of disaster	Number of victims	Storm	January 18 th 1960	4,000	Storm	February 26 th 1959	1,600	Storm	January 6 th 2004	702
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3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 	<p>【Current situation】</p> <ul style="list-style-type: none"> The disaster risks may come with storm and tsunami. 	<p>【Issues】</p>																		
	<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 																				
	<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)*3 	<ul style="list-style-type: none"> Public Emergency Act (1979) National Disaster Relief Fund Act (1980) Public Emergency Regulation (2004) Niue National Disaster Plan (2010) 																			
	<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1)*3 	<ul style="list-style-type: none"> National Disaster Council (NDC) effectively exercises strategy management of disaster. Police Emergency Management Officer (PEMO) performs major tasks under the control of NDC. 	<ul style="list-style-type: none"> 																		
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	<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA2,3) *3 	<ul style="list-style-type: none"> As for tsunami, in the current system, Telecom receives messages from PTWC. 	<ul style="list-style-type: none"> No system has been installed. 																		
	<ul style="list-style-type: none"> Financial Preparation (HFA1) *3 																				
4.Emergency Response (HFA5) *3	<p>【current situation】</p>	<p>【Issues】</p>																			

	<ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	Emergency Executive Group (EEG) carries out emergency activities as well as coordination under the National Emergency Operation Center (NEOC).		
	5. Policy on Community-based Disaster Management*3			
	6. Climate Change Adaptation *4,*5	<ul style="list-style-type: none"> As part of Niue National Climate Change Policy (2009), SPREP and SOPAC have been asked to carry out the concerned research. As part of Disaster Mitigation program of SOPAC, Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015 has been planned. *5 SPC,SOPAC: Strategic Plan 2011-2015 *5 		
Assistance to Challenge	7. Records of Major Assistance by JICA	<Development Research >		
		Project	Year started	Year ended
		<Technical cooperation project>*5		
		Project	Year started	Year ended
		Strengthen Capability for Weather Forecasting and Formulation of Network	2009	
		<Equipment provision >		
		Project	Year started	Year ended
		<Country-and issue based training >		
Project	Year started	Year ended		
<Grant Aid >				
Project	Year implemented	Amount		
<Grant aid for grassroots activities >				
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	8. Assistance Strategies and Records of other Development Partners *5	<ul style="list-style-type: none"> NZAP implements several projects on tsunami covering a wide area. Principal ones are as follows: <ol style="list-style-type: none"> Pacific Tsunami Risk Management Project The following are projects involving cooperation with EU. <ol style="list-style-type: none"> Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (SPC) 		
	9. International Networking			

Source

*1 Website (ja.wikipedia.org)

*2 Website (www.emdat.be)

*3 Niue National Disaster Management Plan (2010)

*4 Niue Delegation for Climate change Roundtable: Niue national Climate Change Policy Niue's Experience (March, 2011)

*5 JICA: Data Collection Survey on Disaster Management in the Pacific (Final Report, April, 2012)

Appendix 10

Inventory on Disaster Management in Palau

Disaster Management in Palau (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> The Palau consists of islands in the Micronesia region with its total land area of 458 km². Its climate is categorized into the tropics. Its average temperature through the year is 27°C, the annual precipitation is about 3,800mm. According to EM-DAT, between 1900 and 2012, no records of natural disaster involving human victims exist.
2. Administrative Division	<ul style="list-style-type: none"> Palau consists of 16 divisions: the state of Aimeliik, Airai, Angaur, Hatohobei, Kayangel, Koror, Melekeok, Ngaraard, Ngarchelong, Ngardmau, Ngatpang, Ngchesa, Ngeremlengui, Ngiwal, Peleliu, Sonsorol.
3. Disaster Mitigation & Preparedness	
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 	
<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> National Disaster Plan (1999) Palau National Disaster Risk Management Framework 2010
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<ul style="list-style-type: none"> Coordination and instruction are conducted and issued by National Emergency Committee (NEC) Under National Emergency Committee (NEC), Disaster Emergency Committee (DEC) declares a state of natural disaster, conducts strategically related activities and approves special budgetary appropriation.
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	
<ul style="list-style-type: none"> Financial Preparation (HFA1) 	
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> Under National Emergency Committee (NEC) that carries out a state-wide emergency measures, CCG conducts operational administration.
5. Policy on Community-based Disaster Management	
6. Climate Change Adaptation	<ul style="list-style-type: none"> In the framework of the Micronesia challenge (commitments by Federated States of Micronesia, Republic of the Marshall islands, Republic of Palau, Guam and the Commonwealth of Northern Mariana Islands), workshops are organized and public awareness-raising activities on climate change are carried out. As part of Disaster Mitigation Program by SOPAC, Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated.
7. Records of Major Assistance by JICA	
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> AusAID provides region-wide projects on disaster administration. Their major projects are as follows. <ol style="list-style-type: none"> Pacific Disaster Management Partnership Cooperation projects by EU are as follows: <ol style="list-style-type: none"> Increasing Climate Resilience of Pacific Small Islands States thorough the Global Climate Change Alliance (by SPC) Disaster Risk Reduction in (Pacific ACP States (2008-2013)
9. International Networking	

Disaster Management in Palau

Current situation and Challenges	1.Feature of Disasters	<ul style="list-style-type: none"> The Palau consists of islands in the Micronesia region with its total land area of 458 km². *1 Its climate is categorized into the tropics. Its average temperature through the year is 27°C, the annual precipitation is about 3,800mm. *1 According to EM-DAT, between 1900 and 2012, no records of natural disaster involving human victims exist. *2 	
	2.Administrative Division	<ul style="list-style-type: none"> Palau consists of 16 divisions: the state of Aimeliik, Airai, Angaur, Hatohobei, Kayangel, Koror, Melekeok, Ngaraard, Ngarchelong, Ngardmau, Ngatpang, Ngchesa, Ngeremlengui, Ngiwal, Peleliu, Sonsorol. *1 	
	3. Disaster Mitigation & Preparedness	【Current situation】	【Issues】
	<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 		
	<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	<ul style="list-style-type: none"> 	
	<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1)*3 	<ul style="list-style-type: none"> National Disaster Plan (1999) Palau National Disaster Risk Management Framework 2010 	
	<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) *3 	<ul style="list-style-type: none"> Coordination and instruction are conducted and issued by National Emergency Committee (NEC) Under National Emergency Committee (NEC), Disaster Emergency Committee (DEC) declares a state of natural disaster, conducts strategically related activities and approves special budgetary appropriation. 	
	<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3 		
	<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA2,3) *3 		
	<ul style="list-style-type: none"> Financial Preparation (HFA1) *3 		
4.Emergency Response (HFA5) *3	【Current situation】	【Issues】	
<ul style="list-style-type: none"> Establishment of emergency response system Lifesaving Helping affected people 	<ul style="list-style-type: none"> Under National Emergency Committee (NEC) that carries out a state-wide emergency measures, CCG conducts operational administration. 		
5.Policy on Community-based Disaster Management*3			
6. Climate Change Adaptation *4,*5	<ul style="list-style-type: none"> In the framework of the Micronesia challenge (commitments by Federated States of Micronesia, Republic of the Marshall islands, Republic of Palau, Guam and the Commonwealth of Northern Mariana Islands), workshops are organized and public awareness-raising activities on climate change are carried out. *3 As part of Disaster Mitigation Program by SOPAC, Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015 have been formulated. 		

Assistance to Challenge	7. Records of Major Assistance by JICA	<p><Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Technical cooperation project ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Equipment provision ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Grant Aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Grant aid for grassroots activities > *3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year implemented	Amount				Project	Year started	Year ended			
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Source: *1 Website (ja.wikipedia.org)

*2 Website (www.emdat.be)

*3 Palau National Disaster Risk Management Framework 2010 (Not available as of Feb. 2012)

*4 JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

*5 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)

(http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)

Note: About item without the mark of reference number, it is based on the following report prepared in April, 2012.

JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)

Appendix 11

Inventory on Disaster Management in Micronesia

Disaster Management in Micronesia (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> Federated States of Micronesia lies in the area of Micronesia, composing from 607 islands with the land area of 702 km². The country's population is approximately 108,000 . The country has a tropical climate with the steady average monthly temperature of 27.1 – 27.5 degrees Celsius. Annual rainfall is approximately 4,400 mm. According to the EM-DAT, natural disaster with largest number of death toll between 1900 and 2012 is as below The record states that there are two natural disasters which resulted in having disaster victims between 1900 and 2012
2.Administrative Division	<ul style="list-style-type: none"> Federated States of Micronesia is divided into four administrative states which are Kosrae, Chuuk, Pohnpei and Yap.
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> In June 2011, USAID/ Office of U.S Foreign Disaster Assistance (OFDA) has identified primary natural disaster risks as king tides, tsunami and storms.
<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) 	
<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 	
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) 	<ul style="list-style-type: none"> The Robert T. Stafford Disaster and Emergency Assistance Act (June, 2007)
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) 	<p style="text-align: right;">【Issues】</p>
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) 	
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA 2, 3) 	<ul style="list-style-type: none"> The Weather Service Organization (WSO) and Disaster Coordinating Office (DCO) receive information related to tsunami and tsunami warnings from the Pacific Tsunami Warning Center (PTWC). Only Pohnpei WSO can receive Emergency Management Weather Information Network (EMWIN).
<ul style="list-style-type: none"> Financial Preparation (HFA1) 	
4.Emergency Response (HFA5)	
5. Policy on Community-based Disaster Management	
6.Climate Change Adaptation	<ul style="list-style-type: none"> In 2009, the country formulated the 'Nationwide Climate Change Policy 2009' which specifies vision, goal and action plans. The country conducts advocacy activities and workshops under 'The Micronesia Challenge (Regional inter-governmental initiatives between the Federation of Micronesia, Republic of Marshall Islands, Republic of Palau, Guam state and the Northern Mariana Islands)'. The country formulated the 'Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015' under the South Pacific Applied Geo-science Commission (SOPAC)'s disaster risk reduction program. SPC,SOPAC: Strategic Plan 2011-2015
7. Records of Major Assistance by JICA	<p>< Country-and issue based training > Training on Climate Change Adaptation</p>
8.Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> AusAID implements a regional project on disaster management: Pacific Disaster Management Partnership *8. USAID provides assistance on the development of legal framework and reducing the risks of natural disasters *4 EU implements technical projects as follows: 1)Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (by SPC) 2)Disaster Risk Reduction in (pacific ACP States (2008-2013)
9.International Networking	

Disaster Management in Micronesia

Current Situation and Challenges Assistance to	1.Features of Disasters	<ul style="list-style-type: none"> Federated States of Micronesia lies in the area of Micronesia, composing from 607 islands with the land area of 702 km². The country's population is approximately 108,000 *1. The country has a tropical climate with the steady average monthly temperature of 27.1 – 27.5 degrees Celsius. Annual rainfall is approximately 4,400 mm *2. According to the EM-DAT, natural disaster with largest number of death toll between 1900 and 2012 is as below *3. The record states that there are two natural disasters which resulted in having disaster victims between 1900 and 2012 *3 <p style="text-align: center;">Natural disaster which resulted in having death toll (1900 - 2012)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>July 1, 2002</td> <td>47</td> </tr> </tbody> </table> <p style="text-align: center;">Natural disasters with more than 5,000 disaster victims (1900 – 2012)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Drought</td> <td>May, 1998</td> <td>28,800</td> </tr> <tr> <td>Storm</td> <td>April 3, 2004</td> <td>6,008</td> </tr> </tbody> </table>	Disaster	Date	Death toll	Storm	July 1, 2002	47	Disaster	Date	No. of victims	Drought	May, 1998	28,800	Storm	April 3, 2004	6,008
	Disaster	Date	Death toll														
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	2.Administrative Division	<ul style="list-style-type: none"> Federated States of Micronesia is divided into four administrative states which are Kosrae, Chuuk, Pohnpei and Yap. *1 															
	3. Disaster Mitigation & Preparedness	<p><u>Current situation</u></p> <p><u>Issues</u></p>															
	<ul style="list-style-type: none"> Identification of Disaster Risks (HFA2) *4 	<ul style="list-style-type: none"> In June 2011, USAID/ Office of U.S Foreign Disaster Assistance (OFDA) has identified primary natural disaster risks as high tides, tsunami and storms. 															
	<ul style="list-style-type: none"> Sharing Information on Disaster Risks with Community (HFA2) 																
<ul style="list-style-type: none"> Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) *5 	<ul style="list-style-type: none"> The Robert T. Stafford Disaster and Emergency Assistance Act (June, 2007) 																
<ul style="list-style-type: none"> Establishment and Enhancement of Disaster Management System (HFA1) *3 																	
<ul style="list-style-type: none"> Disaster Risk Mitigation by Structural Measures and Regulations (HFA4)*3 																	
<ul style="list-style-type: none"> Development of Warning System and Evacuation System (HFA2,3) 	<ul style="list-style-type: none"> The Weather Service Organization (WSO) and Disaster Coordinating Office (DCO) receive information related to tsunami and tsunami warnings from the Pacific Tsunami Warning Center (PTWC). Only Phonpei WSO can receive Emergency Management Weather Information Network (EMWIN). 	<ul style="list-style-type: none"> Areas which can receive EMWIN are limited. 															
<ul style="list-style-type: none"> Financial Preparation (HFA1) 																	
4.Emergency Response (HFA5) *3	<p><u>Current situation</u></p>	<p><u>Issues</u></p>															
<ul style="list-style-type: none"> Establishment of emergency response system 																	
<ul style="list-style-type: none"> Lifesaving 																	
<ul style="list-style-type: none"> Helping affected people 																	

	5. Policy on Community-based Disaster Management																																						
	6. Climate Change Adaptation *6,*7,*8	<ul style="list-style-type: none"> In 2009, the country formulated the 'Nationwide Climate Change Policy 2009' which specifies vision, goal and action plans. The country conducts advocacy activities and workshops under 'The Micronesia Challenge (Regional inter-governmental initiatives between the Federation of Micronesia, Republic of Marshall Islands, Republic of Palau, Guam state and the Northern Mariana Islands)'. The country formulated the 'Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015' under the South Pacific Applied Geo-science Commission (SOPAC)'s disaster risk reduction program. SPC,SOPAC: Strategic Plan 2011-2015 																																					
Assistance to Challenge	7. Records of Major Assistance by JICA *9	<p><Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Technical cooperation project ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Equipment provision ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Training on Climate Change Adaptation</td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant Aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><Grant aid for grassroots activities > *3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended	Training on Climate Change Adaptation			Project	Year implemented	Amount				Project	Year started	Year ended			
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8. Assistance Strategies and Records of other Development Partners :4,*8	<ul style="list-style-type: none"> AusAID implements a regional project on disaster management: Pacific Disaster Management Partnership *8. USAID provides assistance on the development of legal framework and reducing the risks of natural disasters *4 EU implements technical projects as follows: <ol style="list-style-type: none"> Increasing Climate Resilience of Pacific Small Islands States through the Global Climate Change Alliance (by SPC) Disaster Risk Reduction in (pacific ACP States (2008-2013) 																																						
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Source

- *1 Website (Wikipedia: ja.wikipedia.org)
- *2 Website (Japan Metrological Agency :jma.go.jp)
- *3 Website (EM-DAT: www.emdat.be)
- *4 USAID Fact Sheet: Federal States of Micronesia and the Republic of the Marshall Islands (Fiscal Year 2011)
- *5 The Robert T. Stafford Disaster and Emergency Assistance Act (June, 2007) (FEMA592)
- *6 The Federate of Micronesia: Nationwide Climate Change Policy 2009
- *7 Website (SOPAC: www.sopac.org/)
- *8 JICA: Data Collection Survey on Disaster Management in the Pacific Final Report (April, 2012)
- *9 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010) (http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/08_databook/index.html#II)

Appendix 12

Inventory on Disaster Management in Marshall

Disaster Management in Marshall (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> • Republic of the Marshall Islands is a country which covers all the areas of Marshall Islands. Its land area is 181 km² with the population of approximately 62,000. • The country has a tropical climate with the steady average monthly temperature of 27.5 – 27.8 degrees Celsius. Annual rainfall is approximately 3,200 mm. • Rain storms and floods are identified as primary natural disaster risks. • According to the EM-DAT, there are no records of death tolls from natural disasters between 1900 and 2012. • The record states that there are two natural disasters with large number of victims.
2. Administrative Division	<ul style="list-style-type: none"> • Republic of Marshall Islands is divided into 24 administrative areas: Ailuk Atoll, Ailinglaplap Atoll, Arno Atoll, Aur Atoll, Ebon Atoll, Enewetak Atoll, Jabat Island, Jaluit Atoll, Kili Island, Kwajalein Atoll, Lae Atoll, Lib Island, Likiep Atoll, Majuro Atoll, Maloelap Atoll, Mejit Island, Mili Atoll, Namorik Atoll, Namu Atoll, Rongelap Atoll, Ujae Atoll, Utirik Atoll, Wotho Atoll and Wotje Atoll.
3. Disaster Mitigation & Preparedness <ul style="list-style-type: none"> • Identification of Disaster Risks (HFA2) • Sharing Information on Disaster Risks with Community (HFA2) • Development of Legislative Framework and Disaster Management Policy & Plans (HFA1) • Establishment and Enhancement of Disaster Management System (HFA1) • Disaster Risk Mitigation by Structural Measures and Regulations (HFA4) • Development of Warning System and Evacuation System (HFA 2, 3) • Financial Preparation (HFA1) 	<ul style="list-style-type: none"> • In the ‘National Action Plan for Disaster Risk Management (2008 – 2018)’, king tides, storms and floods are identified as primary natural disaster risks. • The Robert T. Stafford Disaster and Emergency Assistance Act (June, 2007) • Under the instructions from the National Disaster Committee (NDC) and the Office of Chief Secretary (OCS), National Plan Implementation Unit (NPAIU) act as the coordinator for disaster management related issues. • Majuro Weather Service Organization (WSO) receives information related to tsunami and tsunami warnings from the Pacific Tsunami Warning Center (PTWC). • Budget for disaster management is allocated under the Disaster Assistance Emergency Funds (DAEF).
4. Emergency Response (HFA5)	<ul style="list-style-type: none"> • DRM NAP task force acts as the implementation body of NPAIU. Its main activities include calling meetings at the time of natural disasters, coordinating among ministries and local governments and implementing necessary activities as the focal point.
5. Policy on Community-based Disaster Management	
6. Climate Change Adaptation	<ul style="list-style-type: none"> • The ‘National Action Plan for Disaster Risk Management (2008-2018)’ specifies counter measures for the climate change. • The country implements advocacy activities and workshops under ‘The Micronesia Challenge (Regional inter-governmental initiatives between the Federation of Micronesia, Republic of Marshall Islands, Republic of Palau, Guam state and the Northern Mariana Islands)’. • The country formulated the ‘Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015’ under the South Pacific Applied Geo-science Commission (SOPAC) ’s Disaster Risk Reduction program.
7. Records of Major Assistance by JICA	<p>< Country-and issue based training > Training on Climate Change Adaptation (2 projects)</p>
8. Assistance Strategies and Records of other Development Partners	<ul style="list-style-type: none"> • AusAID implements a regional project on disaster management: Pacific Disaster Management Partnership *8. • USAID provides assistance on the development of legal framework and reducing the risks of natural disasters *4 • EU implements technical projects as follows: 1) Increasing Climate Resilience of Pacific Small Islands States thorough the Global Climate Change Alliance (by SPC) 2) Disaster Risk Reduction in (pacific ACP States (2008-2013)
9. International Networking	

Disaster Management in Marshall

Current Situation and Challenges	1.Features of Disasters *1,*2,*3	<ul style="list-style-type: none"> Republic of the Marshall Islands is a country which covers all the areas of Marshall Islands. Its land area is 181 km² with the population of approximately 62,000. *1. The country has a tropical climate with the steady average monthly temperature of 27.5 – 27.8 degrees Celsius. Annual rainfall is approximately 3,200 mm.*2 Rain storms and floods are identified as primary natural disaster risks. According to the EM-DAT, there are no records of death tolls from natural disasters between 1900 and 2012. The record states that there are two natural disasters with large number of victims.*3 <p style="text-align: center;">Natural disasters with large number of victims (1900 – 2012)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Storm</td> <td>November 28, 1991</td> <td>6,000</td> </tr> <tr> <td>Drought</td> <td>December 10, 2008</td> <td>600</td> </tr> </tbody> </table>	Disaster	Date	No. of victims	Storm	November 28, 1991	6,000	Drought	December 10, 2008	600							
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	Storm	November 28, 1991	6,000															
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	2.Administrative Division *1	<ul style="list-style-type: none"> Republic of Marshall Islands is divided into 24 administrative areas: Ailuk Atoll, Ailinglaplap Atoll, Arno Atoll, Aur Atoll, Ebon Atoll, Enewetak Atoll, Jabat Island, Jaluit Atoll, Kili Island, Kwajalein Atoll, Lae Atoll, Lib Island, Likiep Atoll, Majuro Atoll, Maloelap Atoll, Mejit Island, Mili Atoll, Namorik Atoll, Namu Atoll, Rongelap Atoll, Ujae Atoll, Utirik Atoll, Wotho Atoll and Wotje Atoll. 																
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5.Policy on Community-based Disaster Management																		

	<p>6. Climate Change Adaptation *4,*7,*8</p>	<ul style="list-style-type: none"> The 'National Action Plan for Disaster Risk Management (2008-2018)' specifies counter measures for the climate change. The country implements advocacy activities and workshops under 'The Micronesia Challenge (Regional inter-governmental initiatives between the Federation of Micronesia, Republic of Marshall Islands, Republic of Palau, Guam state and the Northern Mariana Islands)'. The country formulated the 'Pacific Plan and Pacific Islands Framework for Action on Climate Change 2006-2015' under the South Pacific Applied Geo-science Commission (SOPAC) 's Disaster Risk Reduction program. 																																				
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Assistance to Challenge</p>	<p>7. Records of Major Assistance by JICA *9</p>	<p><Development Research ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Technical cooperation project ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Equipment provision ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Country-and issue based training ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td>Training for Climate Change Adaptation (2 projects)</td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Grant Aid ></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year implemented</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p><Grant aid for grassroots activities > *3</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Year started</th> <th>Year ended</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended				Project	Year started	Year ended	Training for Climate Change Adaptation (2 projects)			Project	Year implemented	Amount				Project	Year started	Year ended			
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	<p>9.International Networking</p>																																					

Source:

- *1 Website (Wikipedia: ja.wikipedia.org)
- *2 Website (Japan Meteorological Agency: jma.go.jp)
- *3 Website (EM-DAT: www.emdat.be)
- *4 Government of the Republic of the Marshall Islands (RMI): National Action Plan for Disaster Risk Management (2008-2018) (2007.11)
- *5 The Robert T. Stafford Disaster and Emergency Assistance Act (June, 2007) (FEMA592)
- *6 RMI: Mechanism for coping with Disasters (Regional Pacific Humanitarian Team (PHT) Workshop Nadi, Fiji, (2009.12)
- *7 Website (SOPAC: www.sopac.org/)
- *8 JICA: Data Collection Survey on Disaster Management in the Pacific (Final Report, April, 2012)
- *9 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)
- *10 USAID Fact Sheet: Federal States of Micronesia and the Republic of the Marshall Islands (Fiscal Year 2011)

Appendix 13

Inventory on Disaster Management in Kiribati

Disaster Management in Kiribati (Synopsis)

1. Features of Disasters	<ul style="list-style-type: none"> • Republic of Kiribati is surrounded by 33 coral reefs with land area of approximately 800 km². Its population is around 85,000 with the average height above sea level of 3-4m. • Average annual rain fall is 2,350mm which is the source of groundwater recharge. • Droughts, floods, sea water intrusion into the ground water and flood caused by torrential rain are identified as primary natural disaster risks. • Due to global warming, coastal erosions, sea water erosions and coral bleaching can be observed in the coastal areas. • Republic of the Marshall Islands is a country which covers all the areas of Marshall Islands. Its land area is 181 km² with the population of approximately 62,000.
2. Administrative Division	<ul style="list-style-type: none"> • Republic of Kiribati is divided into three administrative divisions: Gilbert Islands, Phoenix Islands and Line Islands.
3. Disaster Mitigation & Preparedness	<ul style="list-style-type: none"> • Droughts, floods, sea water intrusion into the ground water and flood caused by torrential rain are identified as primary natural disaster risks.
<ul style="list-style-type: none"> • Identification of Disaster Risks (HFA2) 	
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4. Emergency Response (HFA5)	
5. Policy on Community-based Disaster Management	
6. Climate Change Adaptation	<ul style="list-style-type: none"> • Because of its geographical features, Republic of Kiribati is said to be directly affected by the rise in sea water level due to climate change. • In January 2007, Republic of Kiribati formulated a 'National Adaptation Programme of Action (NAPA)', which is a comprehensive national strategic plan to combat climate change. NAPA addresses urgent issues and current needs. On the other hand, Kiribati Adaptation Project (KAP) addresses long term measures. • There are ten projects under NAPA which are prioritized from one to eight. The first priority is the measures to secure water resource and to make improvements to wells. The overall budget is 15,937,950 Australian dollars. In the first three years, 7,779,458 Australian dollars has been allocated.
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Disaster Management in Kiribati

Current situation and Challenges	1.Features of Disasters	<ul style="list-style-type: none"> • Republic of Kiribati is surrounded by 33 coral reefs with land area of approximately 800 km². Its population is around 85,000 with the average height above sea level of 3-4m *1. • Average annual rain fall is 2,350mm which is the source of groundwater recharge. • Droughts, floods, sea water intrusion into the ground water and flood caused by torrential rain are identified as primary natural disaster risks. • Due to global warming, coastal erosions, sea water erosions and coral bleaching can be observed in the coastal areas. • According to the EM-DAT, between 1900 and 2012, there are no records of natural disasters with more than 10 death tolls. However, there are two natural disasters with more than one hundred victims. <p style="text-align: center;">Natural disaster with the largest death toll (1900-2012)*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>Cyclone</td> <td>October 21, 1972</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: center;">Natural disasters with more than 100 victims (1900 – 2012)*2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Disaster</th> <th>Date</th> <th>No. of victims</th> </tr> </thead> <tbody> <tr> <td>Drought</td> <td>March 1999</td> <td>84,000</td> </tr> <tr> <td>Cyclone</td> <td>October 21, 1972</td> <td>700</td> </tr> </tbody> </table>	Disaster	Date	Death toll	Cyclone	October 21, 1972	3	Disaster	Date	No. of victims	Drought	March 1999	84,000	Cyclone	October 21, 1972	700
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Source

*1 Ministry of Environment, Land, and Agricultural Development:

National Adaptation Program of Action (NAPA) Chap.1, 1.4.1 Geography and Environment (Jan., 2007)

*2 EM-DAT: The OFDA/CRED International Disaster Database,

(<http://www.emdat.be>) (Accessed on 9 April 2012)

*3 JICA: Data Collection Survey on Disaster Management in the Pacific (Final Report, April, 2012)

*4 Ministry of Foreign Affairs of Japan: Data Book for Official Development Assistance for each Country (2010)

land use condition, and city drainage system will be required. Japan has the advanced technology on flood analysis, comprehensive flood control measures on urban areas, and the integrated water resources management. Such knowledge can be applied to solve the problems in the Pacific.

5) Information and Communication System

Emergency information management system in each country is mainly targeted at tropical cyclones. In most of the cases, it is manually-operated and it has not been sufficient systems. Fortunately in each country, cellphone network service is becoming very popular. With cellphone devices, community inhabitants' ability is potentially becoming higher. Introducing emergency information system cooperated with cellphone network services may increase efficiency of NDMO. It will mediate information gathering and delivery between NDMO and community inhabitants and reduce workload of intermediating organizations. Automated workflow may speed up process of information delivery. For now, in order to add efficiency on DRR, it is very important to manage information with leading-edge technology and knowledge of service development. Technologies which Japan has on this aspects will contribute to these countries.