

JTB-DM/148

Report on the
**DISASTER PREPAREDNESS
WORKSHOP**

held in
Funafuti, Tuvalu
14 - 17 October, 1991



Aerial view of Funafuti Atoll. Tuvalu

Australian Overseas Disaster Response Organisation

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FOREWORD

**This Report on the
DISASTER PREPAREDNESS WORKSHOP
held in
FUNAFUTI, TUVALU
from 14-17 October, 1991
was prepared on behalf of the participating agencies
by the
Australian Overseas Disaster Response Organisation.**

It contains presentations and a summary report of the Workshop findings.

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WELCOMING ADDRESS

Mrs Siuila Toloa, B.E.M., Secretary General, Tuvalu Red Cross Society

Honourable Bikenibeu Paeniu, Prime Minister of Tuvalu, Mrs Foketi Paeniu, President, Tuvalu Red Cross Society, Honourable Ministers, representatives of the Australian Disaster Response Organisation and the Pacific Regional Delegation of the League of Red Cross and Red Crescent Societies, participants, distinguished guests, ladies and gentlemen.

As the hosting organisation of this workshop on disaster preparedness for NGOs and Government key personnel, it is with the greatest of pleasure that I extend a warm 'talofa' and welcome to all of you, especially our visitors from overseas. I extend my greetings on behalf of the Tuvalu Red Cross Society. We do hope that you have a pleasant and enjoyable stay here and will find time to see a little of our beautiful country before you return.



May I also express our appreciation to all distinguished guests who have taken time off their busy schedules to attend this simple opening ceremony this afternoon.

Cyclones can neither be prevented nor controlled. The only practical solution in minimising their effects are early warning and self preparedness, which you will learn about during the course of the workshop from the resource people.

This Workshop on Disaster Preparedness, the first to be conducted in Tuvalu, is jointly organised and conducted by the Australian Disaster Response Organisation, the Pacific Regional Delegation of the League of Red Cross and Red Crescent Societies and the Tuvalu Red Cross Society. It will create an awareness and understanding among NGOs and Government of their roles in response to disasters, and I look forward to your active participation.

My sincere thanks to the Australian Government for funding this workshop through AIDAB. I must also mention in this context, the tremendous cooperation we have received from the Government and NGOs, without whose cooperation much of our efforts would have been in vain. Our thanks to you all.

Above all, may I express our gratitude to Hon. Bikenibeq Paeniu, Prime Minister of Tuvalu for having consented to grace this occasion, deliver a key-note address and officially declare open this workshop.

May the peace and blessings of God be upon you all. Fakafetai.

OPENING ADDRESS

Hon. Bikenibeu Paeniu, Prime Minister of Tuvalu

Your Excellency Governor General and your good wife, Honourable Ministers, resource personnel from overseas and from Tuvalu, participants, ladies and gentlemen, I am honoured and privileged to be invited to open this very important Workshop on Disaster Preparedness. On behalf of the Government, I would like to extend a very warm welcome to you all and especially to our distinguished friends from overseas who are able to come to Tuvalu to assist and to share with us their expertise in disaster preparedness.

It is very fitting that this workshop is conducted while talk of disaster aftermaths is still familiar to everyone in Tuvalu. It is almost two years since the latest major disaster struck Tuvalu leaving nearly 85 per cent of the population of Vaitupu Island homeless. Rehabilitation work, especially on rebuilding the destroyed houses, is still underway.

Our small low lying islands of Tuvalu are barely five metres above sea level and are prone to be challenged with disasters many times annually. The word "disaster" for the purpose of the National Disaster Plan may be defined to mean any sudden or serious natural misfortune which may include such disasters as hurricanes, tsunamis, flooding, serious fires, droughts, ship and air disasters, serious epidemics, which are beyond the capabilities of the normal services to deal with.

So far, Tuvalu's generations of today have experienced two major disasters. In both cases, the islands affected were declared "States of Emergency". These major disasters were:

- * Hurricane Bebe of 1972 which devastated nearly 100 percent of the houses, trees and food crops on the island of Funafuti; and
- * Cyclone Ofa in February 1990 which destroyed nearly 85 per cent of residential houses, trees and food crops in the main settlement of Vaitupu Island. Some residential houses were also destroyed by Cyclone Ofa in the islands of Niutao, Nui and Nukulaelae.



At Central Government level, we have a National Disaster Committee consisting of all Secretaries and key personnel who are directly involved in times of disasters. Island Disaster Committees also exist on all islands for the same purpose and particularly on the islands. They are also the points of contact of the National Disaster Committee. The functions and roles of the Committees are being set out in Chapter 22, the National Disaster Plan of the General Administrative Orders. Moves are being initiated for this chapter to be enacted.

Not long after Cyclone Ofa destroyed the islands of Tuvalu last year, a Disaster Rehabilitation Sub-Committee was appointed. This is a Working Committee whose task is to evaluate the damage caused and make recommendations to the National Disaster Committee and to Cabinet of what should be undertaken to rehabilitate the affected areas.

This Government has placed environmental issues as a priority. Global environmental problems, such as the Greenhouse Effect, climate change and associated sea level rise, which have their root causes outside of our region, threaten the land and ocean resources upon which Pacific Island economies and people so heavily depend. Indeed these problems threaten the very existence of our small peaceful islands of Tuvalu and these will be major disasters if we do not make a move to prepare ourselves to the effects or to prevent these. Although it is always the case, I am sure you will all agree that the voice of smaller countries is always lost among those of the more economically powerful or politically influential countries, I am proud to say that Tuvalu, though small and poor, has been very active in its participation in the seminars, workshops and conferences in these areas with our hope that with special effort, we would be able to get our point across.

One of the roles or functions at the National Disaster Committee as set out in our Disaster Plan is "..... ensure that the Plan is regularly exercised to ensure that the various authorities and people know the parts to play in times of emergency". As experienced, the Plan is only put to work or exercised when there is actually a disaster occurring and therefore workshops of this nature will not only remind key personnel directly involved with disasters of their roles but also fulfil a function of the National Disaster Committee.

Nevertheless, if I may recall, that early this year, an Aviation Consultant from the Forum Secretariat while doing consultancy work in Tuvalu put up an Emergency Drill claiming that the Air Marshall plane had crashed into the sea about 5-10 minutes after departing Funafuti Airport. I was abroad at that time but I was proud to learn that the Consultant praised and applauded the prompt reactions of the public at large when they heard the news. Although the consultant did receive unkind remarks on this issue, I am happy to say that this is a good sign to us knowing that everybody is keen to help in times of disaster.

Workshops of this nature are very important, especially since Tuvalu is prone to a lot of disasters. This workshop will better equip the participants in efficiently carrying out their roles in times of disaster. As we all see, the participants are all key personnel or shall I say, main actors and actresses, whenever there is a disaster in Tuvalu. This workshop is bringing together people directly or indirectly involved with disasters from government and non-government backgrounds to help decide and also determine what steps are necessary to properly prepare ourselves and our small islands in times of disasters. I know you will all be equal to this challenge.

To you participants, although you have a busy schedule of events before you, I certainly hope that all of you would be able to take in what these resource personnel are to give you in the coming three days to better equip you in your roles.

Again to our friends from overseas, I do hope that you will take advantage of your presence in Tuvalu with what Tuvalu has to offer.

Last but not the least, I wish, on behalf of the Government of Tuvalu, to express my sincere appreciation to the Australian Disaster Response Organisation, the Pacific Regional Delegate of the League of Red Cross and Red Crescent Societies, and in particular, to the Tuvalu Red Cross Society for developing further the issue of disaster preparedness through the convening of this workshop. This is certainly one area where NGOs are extremely effective. I thank you for your time and it gives me great pleasure to declare the workshop open.

INTRODUCTION TO THE WORKSHOP

Mr JB (Barry) Blake, Australian Overseas Disaster Response Organisation

Honourable Prime Minister,
Rev. Kaua, Mrs Toloa,
distinguished guests and
fellow participants...

On behalf of Mr Xiaohua Wang, Regional Delegate for the Pacific, of the League of Red Cross and Red Crescent Societies, Mrs Lynne Ali, AODRO's Information Officer and myself, I sincerely thank our Chairman Mr Hopi Toloa for his warm words of welcome.

At the start, I would like to pass on to you the warm regards and best wishes of all of the Australian

non-governmental organisations that make up the membership of AODRO. They hope that this workshop, which we bring to you on their behalf, will lead to greater community preparedness and consequently lesser physical damage and personal injury should disaster strike your lovely islands in the coming years.

You should also know that it is by courtesy of the Australian Government that we from AODRO are able to visit you. The Australian International Development Assistance Bureau (AIDAB) have, on behalf of the Australian Government, generously provided funding for our travel and for the costs of this workshop.

Let me assure you that over the next few days we will be very busy. In conjunction with your Chairman, we have set the following four objectives for this workshop:

1. To review the disaster hazards to which Tuvalu is exposed.
2. To become familiar with the details of the National Disaster Plan.
3. To review the roles of NGOs in disasters with a view to integrating NGOs into the plan.
4. To make recommendations regarding ways and means of developing NGO capabilities to assist with disaster management.

You might ask why a small island country, remote from major hazards, should need to bother about disaster management. I would reply that even in your isolation, growing population, increased investment in the built environment and the expansion of transport services and other technologies, all, day by day, increase your exposure to the risk of a disaster impact.

I would also say that no small island country with limited resources can afford to neglect the resources of its NGOs when disasters occur. Worldwide it has been shown, time and time again, that the resources and capabilities of NGOs are invaluable during emergencies. They must therefore be taken account of in planning and integrated into national disaster management arrangements.

Clearly we have a lot to do but I am confident that your efforts over the next three days will lead us to successfully attain those objectives that we have set ourselves. I can assure you that Lynne, Xiaohua and I are looking forward to working with you; and once again I thank you for inviting us to come to your beautiful island country and to work with you on this important workshop.



A SHORT HISTORY OF DISASTERS IN TUVALU

MrHopi Toloa, Disaster Officer, Tuvalu Red Cross Society

If we are not prepared, we must learn what to do before and after a cyclone. We have to help the people of Tuvalu to develop or to improve their ability to effectively respond to cyclones in order to minimise loss of life and /or property.

Cyclones can neither be prevented nor controlled. The only practical solution in minimising their effects are early warnings and self-preparedness about which we will hear from other speakers. Tuvalu has been very lucky to have been spared by the cyclones that have devastated a number of countries in the region from time to time. The only recorded disasters have been the hurricanes that struck the country in 1891, 1958, 1972, and most recently, the one in 1990.

The 1891 hurricane is very known whereas the hurricane of 1958 was of mild nature. Although no lives were lost a lot of damage to houses, trees and crops was done. In the 1972 hurricane, whose name was hurricane Bebe, which struck on the night of 21 of October 1972, six lives were lost, persons were injured and the entire population was left homeless. Nearly everything that stood on ground level was either flattened or destroyed. The stores upon which people had depended including imported commodities were destroyed and as a consequence they had to rely on imported food. As a consequence almost the entire population depended on relief supplies sent from overseas countries.

Ladies and Gentlemen as we did not have many disasters in the past, my presentation this morning is very brief and I will show you some slides on the destruction done by hurricane Bebe in 1972.

Buildings were destroyed by Hurricane Bebe. The Met. Depts.' generators were completely destroyed and written off. Rocks and stones were washed up the storm surge on the night of 21 October. The roof of the staff headquarters for Met observers was completely blown off. It was very surprising to the islanders the following morning, to see the ocean side was covered with a stone beach formed by the hurricane on the night of 21 October. Thank You.



Damage from Cyclone Bebe on Funafuti, Tuvalu, 1972.

TROPICAL CYCLONES AND WARNING SYSTEMS

Mr Fakavai Taomia, Scientific Officer, Meteorological Department

Introduction

Now, I know Hopi has already given you the numbers of cyclones that have affected Tuvalu in the last 60 years. I also will give a brief history of the cyclones that were recorded by the Met office. Mind you, during earlier times there was no Met Office in Tuvalu, so they were recorded by Europeans sailing by. I will give a brief history of cyclones that affected Tuvalu, then I will go over what causes a cyclone. There are many technical terms that are involved in this explanation of how cyclones are formed but I will try to bring it down to the basics so that each of you can understand; and when you go back you will have a general knowledge of how cyclones start.

From my Met. records, dating back to about 1891, we had cyclones originating in Tuvalu and we had cyclones that hit Tuvalu and damaged most of the houses or even the coastal region. If we look at Tuvalu, it is very small, so the coastal region holds many people because we live mostly on the coast. There are about 25 cyclones dating back to 1891. It was said in a report that out of those 25, 23 originated in Tuvalu, that means they were formed in Tuvalu. Of those 25 cyclones there are about six major cyclones including Ofa -1891, 1914, 1928, 1958, 1972 and 1990.

The worst out of these six was Cyclone Bebe, which you have already discussed. Second to that was Cyclone Ofa. Mind you Cyclone Ofa had already passed Tuvalu when a secondary depression hit us. So the damage was actually from a secondary depression occurring after Cyclone Ofa passed Tuvalu. Since I am concentrating mainly on tropical cyclones I will start my talk now on how these cyclones are formed.

Tropical Cyclones

For a cyclone to start it has to have certain conditions, just for example, as when you apply for a job you have to have certain qualifications so that you can get the job. In a cyclone there are a few things that have to accumulate so that they will happen. Tropical cyclone means a cyclone which is formed in the tropics. If you look throughout the tropics you could not find any changes in weather. There are some changes in rainfall, but you have only one season. You do not have winter. The sun comes up and goes down. So it seems to be very hot every day. If you look at the ocean, you have a vast amount of sea, and this sea has a certain pressure on it. You have a weight of air and you have this temperature. Sometimes it might get hotter, it means the temperature will increase. Sometimes it might get colder and the temperature will decrease.

For cyclones to form, the sea level temperature should reach above 26 degrees Celsius. When that happens, most of this air will rise up. It rises up because of the heat. To help in building up a cyclone, the most important effect is the rising up of this air. When air rises up you have a low pressure. Low pressure means that there are not many air particles in that region. Cold air is heavier than warm air. So whenever something is heated up, it rises up, so the rising particles will draw in more cold air to fill in the space. When the water temperature of 26 degrees is reached the movement of air start to take place. This is the starting of the cyclone. There are some other factors, which I do not have any time to explain and are too technical. When hot air rises, you have low pressure which always associates with heavy rain and very bad weather. Now when rain falls the condensation releases heat. So when this heat is released into the atmosphere it helps in warming up the air around that region. That is basically how a cyclone starts.

We always draw a picture of a cyclone. The pictures are taken from satellites. Tuvalu is somewhere in the southwest of the globe. When cyclones happen in the southern hemisphere, the wind always blows in a clockwise direction. Wind is caused by the difference in pressure. Air will flow from high pressure to low pressure. That movement of air is called "wind". If you view this cyclone from a satellite, you will see bands of clouds. Clouds, are caused by the movement of the air rising up. They are building up the energy which the air gains from the latent heat of condensation and the warming up of the sea. So this

DATE (UT)	ORIGIN		SOI
	DEG. SOUTH	DEG. EAST	
4 Feb 1940	9.1	177.8	negative
14 Feb 1940	9.8	177.8	negative
25 Feb 1942	9.9	177.9	negative
21 Jan 1944	10.3	179.8	negative
21 Jan 1948	9.0	179.0	negative
22 Feb 1957	10.9	179.1	negative
1 Jan 1958	8.0	177.0	negative
28 Nov 1958	9.9	179.5	negative
29 Mar 1964	10.6	177.0	positive
7 April 1967	11.7	179.1 W	negative
12 Dec 1967	10.5	179.5	negative
1 Feb 1972	10.0	177.5	positive
19 Oct 1972	7.9	177.m	negative
11 Dec 1976	11.5	176.5	negative
24 Nov 1977	5.9	176.9	negative
3 Jan 1979	5.1	176.1	negative
27 Dec 1979	8.0	175.0	negative
25 Mar 1980	9.5	175.0	negative
8 Feb 1981	9.0	178.0	negative
1 Mar 1981	10.5	177.0	negative
6 Jan 1982	9.0	178.5W	positive
23 Mar 1983	10.0	179.0	negative
26 Dec 1984	9.1	178.2	negative
8 Jan 1985	11.0	180.0	negative

Table 1 Tropical Cyclones In The Tuvalu Region 1940 -1985

is a general picture of a cyclone. In a cyclone, you experience winds and then no winds at all. It means that the eye of the cyclone has passed over you. The eye of the cyclone is calm, there is no wind. About 10 miles from the eye you have hurricane force winds and after that you have gale force winds. You have the eye, you have the hurricane wind and we have the cloud. As you go out you have a very big band of clouds and these clouds give you rain. Cyclones are always associated with rainfall, very strong winds and storm surges.

In normal weather, you have a pressure on top of the water. The pressure is a weight of air. When a cyclone happens it means this warm air rises and there are less air particles pushing down on the water surface. The water will rise up a little bit because there is not much weight on top of the sea-water. When the wind comes, the shear effect of the wind will easily take up that storm surge and take it to shore, in very big waves. That is one of the factors in why we have very big storm surges.

Cyclone Warnings

We are under the hand of the Meteorological Service in Nadi, Fiji. Nadi looks after Tuvalu, Kiribati, Tokelau all those small island nations. In the Meteorological Department, we always have an exercise before the cyclone season, which begins in November and ends about April the following year. We try to show the observers the steps they will have to take when there is an alert or a cyclone warning from Nadi. We gather our data and we send data on rainfall, temperature, relative humidity in hourly stages to Nadi. So from that data and data from other nations under the big hand of Nadi weather service, they will at least know what are the situations in each of the small countries.

If there is a cyclone warning there are different procedures that we have to take. Nadi weather station, which controls other countries in looking after cyclones, always issues weather bulletins on our behalf. We can not forecast because we do not have the manpower and also the advanced technology to get the data and then forecast. So we always have ours from Nadi. I think there could be a delay if there is an emergency.

So in the future, if you try to work hard, we might have our own forecaster in the Meteorological Department and that will minimise the delay in letting people know that the cyclone is very near. The moment Nadi sees a cyclone in other regions, for example like Western Samoa or Niue, (but not in Tuvalu), they always give what we call an 'advisory bulletin', which is a bulletin to let us know that there is a cyclone somewhere, but not in Tuvalu. This type of bulletin we do not give out to the public. If from the meteorological data they find there is likely to be a cyclone developing near Tuvalu, they will give us what we call a 'special weather bulletin' containing a tropical cyclone alert. This means there is a cyclonic development near Tuvalu. It is not strong, it will not destroy anything, but it is starting to develop, so they give us an alert. When an alert is given to the Meteorological Department, the observer, or the one who is on duty, will let the Director of the Meteorological Dept know.

Once you receive the cyclone alert, the basic procedure is to go back to Nadi and tell them that you have received a cyclone alert. But the most important steps that an observer has to take is to let the Officer in Charge of the Met. Dept, know that there is a cyclone development coming and then he types five copies of the cyclone alert. If the cyclone will certainly hit Tuvalu, then Nadi will send another special weather bulletin. You must notice that sometimes they give us a storm warning. In cyclone time they do not introduce storm warnings until the cyclone is about to affect Tuvalu. If the cyclone development will really affect the nation of Tuvalu they will give an alert and after that another one, a special weather bulletin containing either a gale warning or storm warning or hurricane warning. Those are the wind strengths which they go by in Nadi Meteorological Service. When the person on duty at the Met Department sees this, he has to let the Secretary to the Government know, the Officer in Charge of Met know and then type five copies, one to the Chief of Police, one to the Secretary of the Ministry of Works and Communication and then to Broadcasting.

The only way we can reach the outer islands of Tuvalu is by broadcasting the weather bulletin to the outer islands. The main thing is that you have to let the people know beforehand so that they have time to prepare themselves. So when you type out the warning, you should type another seven or eight copies, so you can have them for other people when they come. Now if the cyclone is hitting Tuvalu and there is no weather bulletin received from Nadi, we can ask Nadi half an hour after the previous weather bulletin for a new weather bulletin. Another important thing is that we have to change that English weather bulletin into our local language so that people will know that there is a hurricane coming to Tuvalu.

I think they should include in a cyclone alert advice on the basic necessities persons would need when a cyclone is about to hit. For example, you have to have boiled water, you have to have batteries and you have to have a transistor radio because one time or another there won't be any electricity. You have to have a pressure lamp and you should put up you window shutters etc.

It is lucky that we only have cyclones; we do not have the earthquakes or tornadoes. I think that's the end of my small and very basic talk about cyclones and warning systems in Tuvalu.

INTRODUCTION TO DISASTER MANAGEMENT

Mr Barry Blake, Executive Director, AODRO

Introduction

Kiribati is no stranger to disasters caused by storms, drought, disease and various types of technological accidents. The question we are about to address is whether these events, and the situations they produce, are manageable, or are they 'Acts of God' and beyond our control?

Disaster

A disaster occurs when a large-scale 'hazard' impacts on a community so as to cause either physical or social crisis amongst a substantial proportion of that community.

This definition of 'disaster' can be expressed in the form of a disaster equation as follows:

$$\begin{aligned}
 & \text{EXTREME HAZARD + VULNERABLE COMMUNITY} \\
 = & \text{PHYSICAL OR SOCIAL CRISIS} \\
 = & \text{DISASTER}
 \end{aligned}$$

Hazards

The 'hazards' that can cause disaster are many and so they are often categorised along lines similar to the following:

Table 1 Disaster Agents

<i>DISASTER TYPE</i>	<i>HAZARD TYPE</i>	<i>EXAMPLES OF HAZARDS</i>
<i>NATURAL</i>	<i>CLIMATIC EVENT</i>	<i>TROPICAL CYCLONE STORM DROUGHT</i>
	<i>GEOLOGICAL UPHEAVAL</i>	<i>EARTHQUAKES VOLCANIC ERUPTION TSUNAMI</i>
	<i>PESTILENCE</i>	<i>INSECT PLAGUE DISEASE</i>
<i>MAN-MADE</i>	<i>ENVIRONMENTAL CHANGE</i>	<i>SEA-LEVEL RISE DESERTIFICATION DEFORESTATION</i>
	<i>INDUSTRIAL OR TECHNOLOGICAL ACCIDENT</i>	<i>FIRE EXPLOSION TOXIC SPILL HAZARDOUS CAS LEAK</i>
	<i>PHYSICAL AGGRESSION</i>	<i>CIVIL DISORDER TERRORISM WAR</i>

Vulnerability

A 'vulnerable' community is a community that is 'at risk' to the hazard. The degree of risk will vary with the size of the hazard but it also reflects how well the community has organised themselves to withstand the impact of the hazard.

For example: In 1989 an earthquake of magnitude 6.9 impacted on the city of San Francisco, USA. This was a major quake and 60 people were killed. In 1972, an earthquake of magnitude 6.2 struck Managua, the capital of Nicaragua in South America. Despite it being less severe than the San Francisco earthquake, it reduced the centre of Managua to rubble and killed an estimated 6,000 people.

The difference between the two events was the relative vulnerabilities of the cities. San Francisco is a highly developed, industrialised city. It is well engineered for earthquakes and is therefore of low vulnerability. Managua was an underdeveloped city in a relatively poor country. It was not built to earthquake engineering standards and was therefore highly vulnerable to an earthquake. Vulnerability therefore reflects the level of development: the availability of resources and the use made of those resources to mitigate the impact effects of a disaster hazard.

Crisis Level

"Disaster" is used in general speech to indicate anything from a minor personal misfortune to some great community calamity. Such a broad usage of the word is not satisfactory to people or organisations that have a responsibility for taking counter-disaster action. It is more useful to subdivide the types of crisis events into more or less arbitrary categories. Three useful categories which represent increasing levels of social crisis are "accidents", "emergencies" and "disasters", as illustrated in Figure 1.

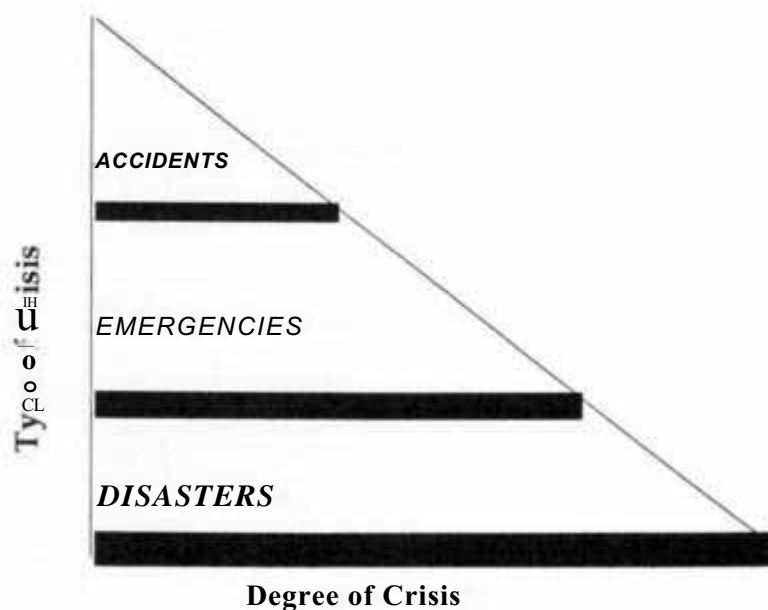


Fig. Categories Of Crisis Events

Based on the above, a disaster can be said to be a community crisis that is characterised by a high level of social disruption and physical destruction. Clearly, there are many possible degrees of destruction, disruption and crisis, but most practitioners would agree that a disaster has occurred when the degree of community crisis is such that assistance from outside of the affected area is needed.

Characteristics Of A Disaster

The level of crisis that distinguishes a 'disaster' from an 'emergency' is somewhat arbitrary, but a disaster can be recognised as having the following characteristics:

- * large section of community affected
- * substantial community infrastructure destroyed
- * affected people need help
- * emergency services are inadequate
- * outside response is needed

Management

Having developed our understanding of what a 'disaster' is, we should come back to the main issue: Can we manage disasters?

Managing disasters means having control over the amount of physical and social crisis that occurs. If we look back at our 'disaster equation' we will remind ourselves that disasters are caused by the impact of an extreme hazard on a vulnerable community. The hazard can be either 'natural' or 'man-made' but in either case it is largely outside of our control. That is, it is either a natural phenomenon (Act of God) such as a cyclone, or some man-made event such as an industrial explosion and fire. While we may not be able to control the hazard impact, what we can hope to control is the vulnerability of communities to these events. Therefore, we should look at the things we can do before, during or after the disaster event to control the effects of its impact. This introduces us to the 'Disaster Cycle'.

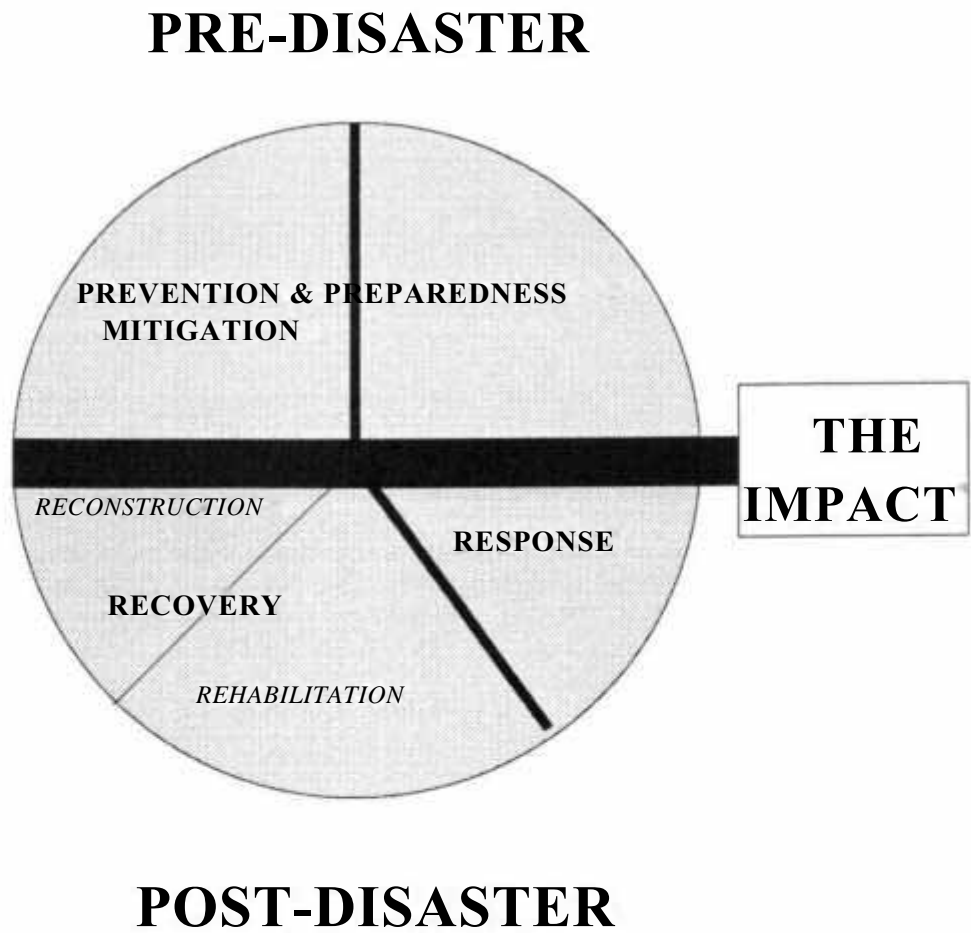


Fig 2. The Disaster Management Cycle

The Disaster Cycle

For the purpose of disaster management, disaster can be divided into four distinct phases, each requiring a particular management approach. The phases of the disaster management cycle are:

- * Prevention / Mitigation
- * Preparedness
- * Response
- * Recovery

This disaster cycle is shown diagrammatically In Fig 2.

Pre-disaster Phases

The pre-disaster period is that period of 'normal' time which, in a disaster-prone country, will sooner or later end with a disaster. This period, of unknown duration, should be devoted to prevention/mitigation and preparedness activities.

Prevention/Mitigation

Prevention / Mitigation activities are those long-range measure which protect a community from disaster by reducing the probability of a disaster occurring or by lessening the impact of unavoidable disaster. Hazard analysis, prediction, vulnerability analysis, sea wall construction, land-use regulations which exclude habitation from high-risk areas, building codes and the construction of storm shelters are all examples of disaster prevention/mitigation measures. These measures should be integrated into a country's program of development works. They will justify their cost on the basis of economic saving or the avoidance of human suffering, or both.

Preparedness

Preparedness refers to those 'readiness' activities which will ensure prompt and efficient action, at all levels, to save lives and minimise property damage when a disaster occurs. The development of a counter-disaster organisation, public awareness programs, training of relief workers, warning systems, food stockpiling and medical supplies and sound planning at all levels provide the basis for rapid rescue and relief when disaster strikes.

The essential components of disaster preparedness are planning and preparation. Only as a result of planning and preparation can resources be rapidly and effectively mobilised to aid a stricken community. Resources must be earmarked and lines of authority for utilising them known. Assessment teams and relief personnel need to be organised, trained and practised in their roles. Planning, training and rehearsing are essential if a country's resources are to be mobilised quickly and integrated harmoniously into a coordinated and efficient relief effort.

At national and provincial government levels, it is desirable that counter-disaster plans be backed by legislation. NGO plans should always conform with government plans and should flow from an agreement with Government about the roles of NGOs in disasters. These roles should be written into the official plans.

Post-disaster Phase

The post-disaster phase is characterised by a short and intensive response period when search and rescue and emergency relief operations are undertaken, followed by a long period of recovery from the disaster impact.

Response

The response phase should not last much longer than about seven to fourteen days. The aims of disaster managers during this phase are to save lives and property, minimise the suffering of the survivors, remove any further threats and find out the nature and extent of the disaster.

The emergency operations required will depend upon the particular situation but could include some or all the following:

évacua tion	emergency shel ter
reconnaissance	subsistence supplies
search and rescue	emergency transport
treatment of casualties	welfare enquiry
clearance of debris	communications
food and water	public information

Recovery

Following the emergency phase, during which the primary concerns are the saving of life and the meeting of essential human needs, there follows the recovery phase which can be subdivided into periods of rehabilitation and reconstruction. During this phase, life is gradually brought back to normal.

Rehabilitation involves the provision, at least on a temporary basis, of a reasonable level of services and some economic life. The aim is to ensure that life is made tolerable for everyone, although there may still be some hardship. The rehabilitation period provides a breathing space during which deliberate plans are made for permanent reconstruction. Rehabilitation often means providing temporary shelter, establishing a makeshift water supply, re-establishing a food supply and distribution system, and assuring an acceptable level of public health.

Reconstruction is based on a detailed survey of damage and involves the provision of long-term or permanent remedies to the disaster. People from the stricken area might rebuild permanent housing, damaged roads and airfield are rebuilt, the water supply and sanitation systems might also need to be reconstructed. The whole fabric of the community and its cultural life should take on an air of renewal. Reconstruction after a disaster should be used to make things better than before, otherwise a great opportunity is lost.

Reconstruction should be harmonised with the long-term development plans for the community. It will nearly always demand some reallocation of resources and priorities, but the disaster should not be allowed to overturn established development objectives. Rebuilding and new construction must, on the basis of lessons learnt from the disaster, be done in such a way as to give greater protection against any similar event in the future.

Summary

Our analysis of the phases that make up the disaster cycle is now complete. I hope that you agree that there is much that we can do to control the suffering and disruption caused by hazards that from time to time impact on communities. This way of thinking about disasters is relatively new and our concepts of disaster management are still developing. We have passed from a period of 'ignorance' to one of 'understanding' about disaster events. Communities are passing from accepting disasters as 'Act of God' to expecting appropriate action from authorities. Disasters are no longer 'unmanageable' but are our responsibility to 'manage'.

TYPICAL NGO ROLES IN DISASTERS

Mrs Lynne Ali, Information Officer AODRO

Prevention And Mitigation

- * Advocacy on behalf of vulnerable communities
- * Community education, for example on building houses or growing crops
- * Implementation of development projects incorporating prevention and mitigation Measures
- * Information dissemination

Preparedness

- * Advocacy on behalf of vulnerable communities
- * Community education, for example on self-help measures, avenues of assistance & warnings
- * Training for NGOs and the community
- * Planning including writing and practising organisational plans and having well established structures in place for coordination with other NGOs, Government and overseas partners
- * Stockpiling relief goods

Emergency

- * Advocacy on behalf of vulnerable groups
- * Assessment and reporting of needs
- * Assistance with search and rescue
- * Care for special groups such as: children, the disabled, aged or infirm, evacuees and homeless.
- * Cleaning up
- * Clearance of roads and tracks
- * Counselling
- * Distribution of emergency assistance
- * First aid
- * Help with evacuation
- * Information dissemination
- * Pastoral care
- * Provision of: emergency shelter, shelter materials, clothing, household items, food, water, organised volunteer labour, medicine, comfort, evacuation centres, temporary storage, transport and tracing services.

Recovery

- * Advocacy
- * Assessment and reporting of needs
- * Assistance with specific recovery programs such as : rehousing, replanting, rebuilding, small industries, health, feeding programs and repairing.
- * Child minding
- * Counselling
- * Encouraging self-help programs
- * Information dissemination
- * Pastoral care
- * Regular distribution of relief items
- * Recreational activities
- * Seeking specialist assistance from overseas partners

THE ROLE OF THE RED CROSS IN DISASTERS

Mr Xiaohua Wang, Pacific Regional Delegate, LRCRCS

Introduction

My speech will concentrate on the role and responsibility of the Red Cross in disaster relief situations.

This morning Lynne gave you quite a general and comprehensive introduction to NGO roles in disasters. And although maybe in today's world the Red Cross is one of the most well-known organisations, there are some confused ideas about the Red Cross. For some people the Red Cross is a hospital, an ambulance, the provider of blood transfusions, first aid, a group of old ladies talking, or to some countries the Red Cross is a club of local expatriates. Maybe before I move to the main topic of my speech, I will give a brief summary of the Red Cross' history.

Maybe many of you have already heard the name Henri Dunant, who was the founder of the Red Cross in the last century. In 1859, Dunant who was a businessman from

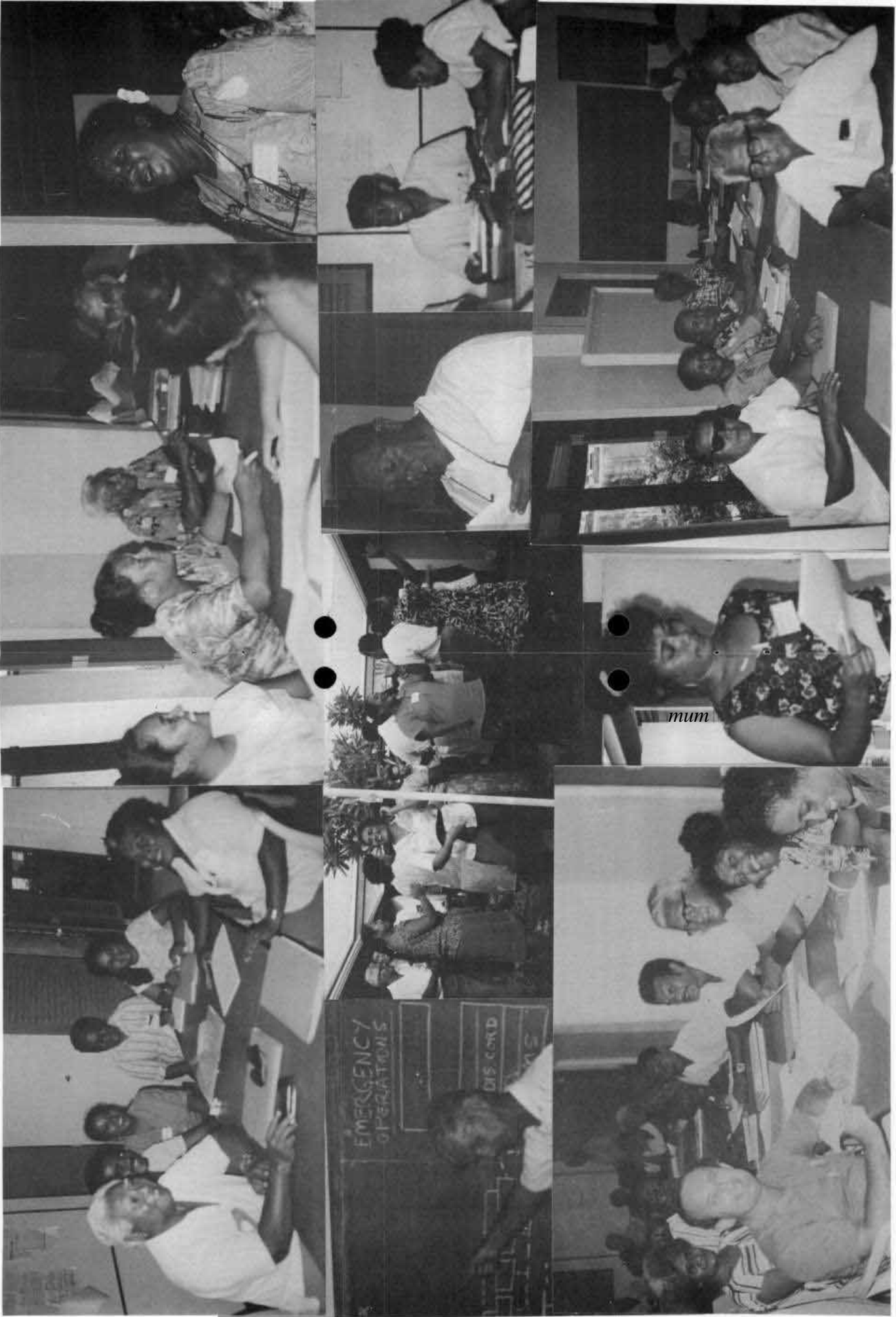
Geneva, Switzerland, witnessed the aftermath of a very crucial battle between the armies of imperial Austria and the Franco-Sardinian alliances in Northern Italy, in a small village named Solferino. Historians have said it was bloodiest battle in human history and 40,000 soldiers were killed or wounded. Dunant saw thousands of wounded soldiers dying without any attendance because at that time the military did not have any appropriate services to attend to wounded soldiers. So the wounded soldiers were abandoned by both sides and many of them died without aid.

So Henri Dunant stopped his trip and he mobilised the local people to organise relief and help the wounded people regardless of whose side they had fought on. He managed to rescue many lives. On his return to Geneva he wrote a book, *A Memory of Solferino*, in which he first asked whether there was a possibility in peace time that each country could set up a relief organisation with trained volunteers and willing carers to be ready when there was a war. They could be sent to the battlefield and deliver medical care to all wounded soldiers without distinction. This aid organisation would be 100 per cent neutral.

His idea was quite positively responded to by dignitaries and politicians in Europe. In 1863 a committee was set up in Geneva which was called the International Committee For Relief To The Wounded, the founder body of the International Committee of the Red Cross (ICRC). One year later a diplomatic meeting was summoned in Geneva and the first Geneva Convention was founded by the political powers of Europe of that day. This is the background of the Red Cross Society. Then the Red Cross started not only in Europe but also in other countries, Asia, in Africa and in the Americas.

After the First World War the world was very optimistic and they thought it was the last war of human history and there would not be any war in the future. It is now known that was not true. But before that time, all Red Cross Societies were fully concentrating on war situations. But it seemed that there was no





longer any war so it was not known what the Red Cross would do. A prominent leader of the American Red Cross started the idea to build a federation of all Red Cross Societies. The main purpose was to give a new task to the Red Cross Society not only to concentrate on war conflict situations but also to assist the public authorities in natural disasters. In 1919 it was named the League of Red Cross Societies and about ten years ago this organisation was renamed League of Red Cross and Red Crescent Societies. The Red Crescent is the same as Red Cross and is used only by Islamic countries. They prefer to use another emblem. Legally, Red Crescent enjoys the same status as the Red Cross. So this is a very brief history of the Red Cross. When we are talking about the Red Cross, we mean the Red Cross and the Red Crescent.

The Movement

The Red Cross and Red Crescent movement consists of three main bodies. Firstly the ICRC, International Committee of the Red Cross, which was the successor of the five members of the original founding Committee in 1863. The second is the League of Red Cross and Red Crescent Societies, which I am representing now at this workshop and the third is the National Red Cross or National Red Crescent Societies. Altogether these three components consist of the International Red Cross and the Red Crescent Movement.

What is the difference between ICRC and the League? We have a different mandate according to the Geneva Convention. ICRC is mainly dealing with what we call man made disasters that is all war, civil strife and conflict situations. If you read the newspapers about the Red Cross delegates visiting prisoners of war they are from ICRC. The League is the Federation of the National Societies worldwide. We are dealing more with the National Societies regarding their natural disaster relief and development of traditional services.

Thirdly, are National Societies. So far we have 147 National Societies worldwide. There are 250,000 Red Cross volunteers and members worldwide under this umbrella. The superior body of this movement is what is the International Conference of Red Cross and Red Crescent the three components of the movement, plus those governments who are signatories of the Geneva Convention.

The Tuvalu Government is one of 170 countries who adopted the Geneva Convention but the Tuvalu Red Cross is not yet a member of the Federation for various reasons. There are 147 National Society members, but we also have about 15 Red Cross or Red Crescent Societies which are not yet our members. They are Red Cross Societies in their country and they have activities. They have basic structures and some have traditional programs and services but are not members. We call them National Societies in process of formation and half of these 15 societies are in the Pacific area: Tuvalu, Kiribati, Vanuatu, Solomon Islands, Cook Islands and Marshall Islands. One of the purposes of my visit is to assist the process for the Tuvalu Red Cross to become a full member of the Federation. We have some conditions to be met and I personally believe that the Tuvalu Red Cross has almost met all the conditions so the next step is an application.

Disaster Relief

Since the founding of the League it has given disaster relief a major priority. Our records in Geneva show since 1919 the day the League was founded, until last year, that the League has run more than 700 international appeals. I think that about one third of them have been for a war or conflict situation. But more than half of them are for natural disasters, and I think than more than 200 appeals were launched after floods and 100 were launched after droughts and also earthquakes. The League has through international appeals managed to help a lot of hundreds of millions of victims of natural disasters.

You have a copy of the August AODRO Newsletter which gives a brief idea and introduction about the League during a disaster situation. First I will explain to you the normal process when a country is affected by natural disasters and what the Red Cross should do.

Each society has a commitment and obligation to mount relief operations when their own country is affected by natural disasters. It is an obligation of the National Red Cross Societies and also internationally all the Red Cross Societies also have commitments and obligations to help each other. The League will be the coordinating body to organise international assistance and there are some basic rules or characteristics of Red Cross disaster relief operations.

First, Red Cross relief should be auxiliary and supplementary in nature to the public authorities, because everywhere in the world, no matter whether in the Pacific or Asia or Europe, the overall responsibility

for disaster relief is with the Government. We cannot be too ambitious because although the response of the Red Cross Societies are generally quick and effective, they never can supplement the government responsibilities. Second, Red Cross Relief operations generally are for emergency cases. In the past when a country was affected by a disaster very often you will find that the Red Cross was the first organisation to respond. In most cases they are also the first organisations to leave when the emergency phase is on. The situation is changing nowadays and we are emphasising disaster preparedness. For instance in Bangladesh, we have a very big disaster preparedness program. Thirdly Red Cross disaster relief operations must be truly voluntary and free of charge.

The beneficiaries of our operations are the victims, without distinction, political or religious or whatever. The next condition is that the Red Cross relief operations should concentrate on the most vulnerable groups because we cannot cover all of the victims in the big disasters. The Red Cross relief operations must be economical, efficient and effective. The last condition is accountability of Red Cross operations. The funding we have is from public donations or donors and for Pacific disasters it mainly comes from the Australian Red Cross, New Zealand Red Cross, Japanese Red Cross and in turn they make their own appeal to their public in Australia, New Zealand or Japan. They have a responsibility to their donors in how their contributions are used. As a coordinating body, we also have our share and we have our commitment to report back how the funds were used. We often ask the National Society to provide us with a regular narrative and financial report and the National Society cannot use the funds earmarked for that particular project for any other purpose.

The governments supporting the Red Cross in these relief operations should give some privilege to the Red Cross operations and in many countries in the world the Red Cross has the privilege that when they receive or transport relief goods they are tax exempted.

Finally I will give you an idea as to how we launch an international appeal. When a disaster occurs in a particular country, we hear the news normally from the mass media and then we receive information from the National Red Cross Societies in that country by telephone or telefax or by telex. The National Red Cross Societies report to the League on what action has been taken to use their own resources to deliver their supplies and their relief. We share this information by fax, telex or telephone to other donors or potential donors. We will tell them if something happened in that country and that we are waiting for more information, but this is the information that we have got and please be ready.

If the national societies cannot cope they will request us to launch an international appeal. Then, if the magnitude is so big, the National Red Cross Societies ask the League for international assistance. That means they ask the League to launch an appeal. When the National Societies send a request they should also send us a detailed proposal, a budget, explanations and give a very clear picture of the operation and also if the relief supplies they ask for are available locally, the price and the budget. Very often the League will send a delegate to that country immediately to help the National Societies to conduct a survey assessment on the needs. Based on this assessment together with the national societies we will launch an appeal. But only at the request of the National Societies. In Geneva we cannot take the initiative to launch an appeal without the consent of the National Societies. Normally the appeal will go to all members of the National Societies and also to UN bodies, NGOs, etc.

We normally ask when appealing for funds that the cash should come to Geneva to be distributed to National Headquarters of National Societies from there or, if we have a country delegation there, through our delegation. If donors can send goods like food such as rice. Of course we do not ask them to send all those things to Geneva, but to the countries affected, but Geneva should be informed also.

That is the end of my brief overview of the role of the League in disasters.

N.B. At the eighth General Assembly in Budapest November 1991 the League was renamed the International Federation of Red Cross and Red Crescent Societies (IFRC). At that time, the total number of member societies was 150 including the Solomon Islands Red Cross Society, which was admitted during the proceedings.

INTRODUCTION TO COMMUNITY EDUCATION ABOUT DISASTERS

Mrs Lynne Ali, Information Officer, AODRO

What Is Public Awareness?

Public awareness is that desirable level of knowledge whereby vulnerable members of the community understand the nature of hazards and their potential for disasters, as well as the appropriate methods of prevention, preparedness and response, in order to save lives and property. It is more than just public warning.



Rationale

Before planning a campaign it is crucial to answer these questions:

- 1) Who need it?
- 2) Why is it necessary?
- 3) Who should develop it?
- 4) What will it say?
- 5) What form will it take?
- 6) Was it successful?

Who Needs It?

Everyone vulnerable: individuals, families, communities. Everyone who can influence or affect that vulnerability such as officials, scientists, media and teachers. But remember that they all require different types and amounts of information. Therefore programs must be flexible.

Why Is It Necessary?

Is a community or a group of people within a community vulnerable to disaster? If the answer is yes, then is hazard awareness part of the community's ethos? If not, develop a program. If so, assess its effectiveness. A simple technique is to ask questions such as: Do you live or work in a hazard prone area? What would you do if a cyclone struck your village? What is the warning system? Where would you go for help?

Who Should Develop It?

Members of the vulnerable groups, community leaders, including NGOs, local media representatives, teachers and practitioners should work together to develop the material. With one or two people being the focal point of the program. Public awareness material should be developed locally rather than nationally.

What Will It Say?

Possible messages could include the following:

On prevention/mitigation

- Building codes
- child inoculations
- self-help housing projects

On preparedness

- hazard information-characteristics, potential to harm and likely effects
- warnings
- reminder of threat
- system to issue warnings
- instructions
- personal preparation procedures
- how to protect belongings
- items to store
- family drills

On response

- emergency plans
- evacuation centres
- emergency personnel
- improvising shelter and food

All the above requires information on local vulnerability, topography, basic meteorology, disaster history and economic consequences.

How Do You Get The Information?

Collect it from other sources. Do not reinvent the wheel. Assess it and most importantly adapt it to your conditions. If nothing appropriate is available then develop it.

What Will It Take?

There are various channels and formats suitable. But all have one of two drawbacks. It is important to utilise several different forms to ensure your message get across to the people you want to help.

word of mouth	print
radio and television	talks
training programs	mobile exhibitions
posters	slogans
storytelling and traditional theatre	calendars
competitions	include in school curricular

Was It Successful?

All public awareness programs must be assessed for their effectiveness. Simple assessment techniques can include: putting contact addresses on brochures, questionnaires, radio phone-ins or surveying families at random.

It is crucial that some form of assessment is conducted throughout the program. In summary, the basic strategy for an effective public awareness program is

- a) mobilise a team
- b) determine the facts
- c) plan the project
- d) secure the resources
- e) develop the material
- f) implement the program
- g) evaluate its effectiveness

Be specific: design programs which are appropriate to a risk, a community and a geographic area. Remember that the most effective counter-disaster strategy is to develop a self-reliant community.

INTRODUCTION TO THE GREENHOUSE EFFECT

Mr Fakavae Taomia, Scientific Officer, Meteorological Department

Introduction

You might have read in Pacific Islands Business or newspapers that we are threatened by the Greenhouse Effect. It is really important for the islands of Tuvalu because we are the most threatened in the world, along with Kiribati, the Maldives and the Marshall Islands. We are not even four metres above sea level. So today we will talk about the Greenhouse Effect and mind you, in the next three years we may be the ecological refugees..., environmental refugees..., who knows?

What is the Greenhouse Effect? If you look around the world, if you look around Tuvalu, see the sky, see the land, see the sun coming up, see the sea, all of these play a major role in this topic of the Greenhouse Effect. Imagine the earth and the sun.

In the morning you see the sun coming, and it reaches the land. Now the Greenhouse Effect has been in the world for millions of years, it has been keeping the earth warm by itself. Between the sun and the earth we have what we call the atmosphere. In the atmosphere you have different layers and you have clouds. You have air and air is made up of many different elements. For example

air is mostly made up of oxygen and nitrogen. Then you have carbon dioxide, water vapour and ozone, and other greenhouse gases such as methane and nitrous oxide, which have been man-made by releasing things into the air.

If the energy that the sun gives to the earth is 100 per cent, when that 100 per cent comes from the sun to the earth, what happens? Of the sun's energy, 40 per cent would be reflected back before reaching the earth by the layers of atmosphere which are further and further up as we take the earth as our point of origin. When that forty per cent is reflected back the other 60 per cent comes down to the earth. Out of the 60 per cent only 45 per cent actually reaches the earth while the other 15 per cent is lost in the atmosphere. When that happens the earth gets warmer. After warming up, the earth reflects back that radiation, which is mainly in the infrared range of radiation. The water vapour in the atmosphere and carbon dioxide absorb the infrared radiation. They collect this radiation from the earth, and they re-emit it back to earth. That re-emittance of the infrared radiation back to the earth is called the Greenhouse Effect. It means there is more warming up.

You can see in overseas countries, they do the same thing. They have buildings, where they control the temperature in order to grow plants. The sun comes up, shines on the surface of the roof and certain energy will go to the plants. The plants absorb some of that sunlight and some will be reflected back onto the surface of the roof. The roof will not allow the heat to get out of the house but will reflect it back to the inside to keep it warm. The Greenhouse Effect has been going on for millions of years keeping us warm.

Now we have industry built up, ships, motors cars running round and planes. People clear out many forests, they get rid of the trees and build buildings and factories instead. That is the problem that we are facing now. Actually in Tuvalu we do not do that, we do not have any factories, we do not have any deforestation or we do not have any farms which release all these gases up into the atmosphere. So what happens? When man starts building industries or clearing forests, cutting down trees for wood for



building houses, it changes this normal way of re-heating the earth. When man did this, all of the gases go up into the atmosphere as greenhouse gasses.

The solar radiation comes down. We have the land, the atmosphere and some of this radiation is being reflected before it even reaches the earth's surface. Some would be lost or used by the atmosphere, some will reach the earth's surface and then be reflected back to space. So when this radiation is reflected back (the scientists call it short wave radiation) we have so much carbon dioxide in space that it will be more absorbing of heat. There will be more heat re-emitted to the earth's surface and that will result in more warming. There are many other types of gases which are called the greenhouse gases. The amount of carbon dioxide in the atmosphere is increasing.

There is another Greenhouse gas called methane. Methane is mainly derived from animal waste. Some of this waste is used by farmers for fertilisers. When you put the waste products of animals in water, after a few weeks or months you have a gas formed. We can use methane for fuel. Most of the methane comes mainly from rice paddies.

Chlorofluorocarbons

CFCs are man-made. If you use air conditioning, sprays, refrigerators, all of these contain CFCs. There are two types of chlorofluorocarbons. They are compounds of carbon, hydrogen and some chlorine gas. If you look around Tuvalu, we do not have many airconditioners We have plenty of refrigerators but it is a small percentage of the total in the world. However, there is an increased number of CFCs being released by the earth's surface to the top of the atmosphere. Because we are a growing population, we are building more buildings and since we like a very good working environment, we use air conditioners and refrigerators. If you look at the statistics of 1960, there is a small amount of these gases in the atmosphere but as you come to the seventies and nineties, you have a big amount of these greenhouse gases in the atmosphere. These greenhouse gases are very frightening because we will likely have extra warmth, or extra heat that is re-emitted by the atmosphere to the earth.

Sea Level Rise

If you already know about the Greenhouse Effect you might know about the sea level rise. Why does the sea level rise when the earth is warmer? Just imagine if you boil some water or use a thermometer. Put the thermometer down in very hot water and you will see the mercury go up. It has expanded because of heat inside the tube. If you boiled water in a kettle and you blocked all the openings, you might have an explosion because the water inside expands. The water inside has gained energy, heat energy from the flame so it warms up and expands. If sea water gets warmer and expands the level of the water will rise. The other factor in sea level rise is the poles. The north and south pole are mainly ice so that extra warming could melt them which could also give a major rise to sea level.

Conclusion

That is why when you read something about the Greenhouse Effect you usually associate it with sea level rise. If the sea rises a lot then there won't be any more Tuvalu. If we had plenty of wood we could build an ark. Maybe Australia can give us a piece of land?

It is good to understand what you read and what you hear people talking about because if you understand the whole picture, you are in a good position to do something about it.

UNDERSTANDING SEA-LEVEL RISE PREDICTION FOR PACIFIC ATOLLS

Mr Barry Blake Executive Director, AODRO

The Greenhouse Effect And Climate Change

The Greenhouse Effect is not new. Scientists have known for centuries that a layer of gasses surrounds the Earth like an insulating blanket. The sun's visible radiation penetrates this gas layer and warms the Earth's surface. The Earth then radiates this heat (infrared waves) back out towards space. Not all of this radiated heat penetrates the gas layer which is made up principally of carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs) and tropospheric ozone. If this insulating blanket of gasses was not there, the Earth would lose its absorbed heat very quickly and become extremely cold at night. The greenhouse gasses, particularly carbon dioxide, trap the reflected radiation and re-radiate some of it back to Earth. This is the Greenhouse Effect which keeps the Earth warm enough for people, plants and animals to flourish.

Our climate has never been static however. Over the past 15 thousand years global temperatures have been slowly rising as we moved out of the last 'ice age'. What is happening now though is that there has been a relatively sudden increase in the production of greenhouse gasses by the people of this and recent generations. Consequently, there is a growing concern that as the blanket of greenhouse gasses thickens, more radiation will be trapped and the Earth's atmosphere will get warmer more quickly than has been occurring over recent millennia.

The atmosphere acts like the glass of a greenhouse, trapping some of the sun's warmth.

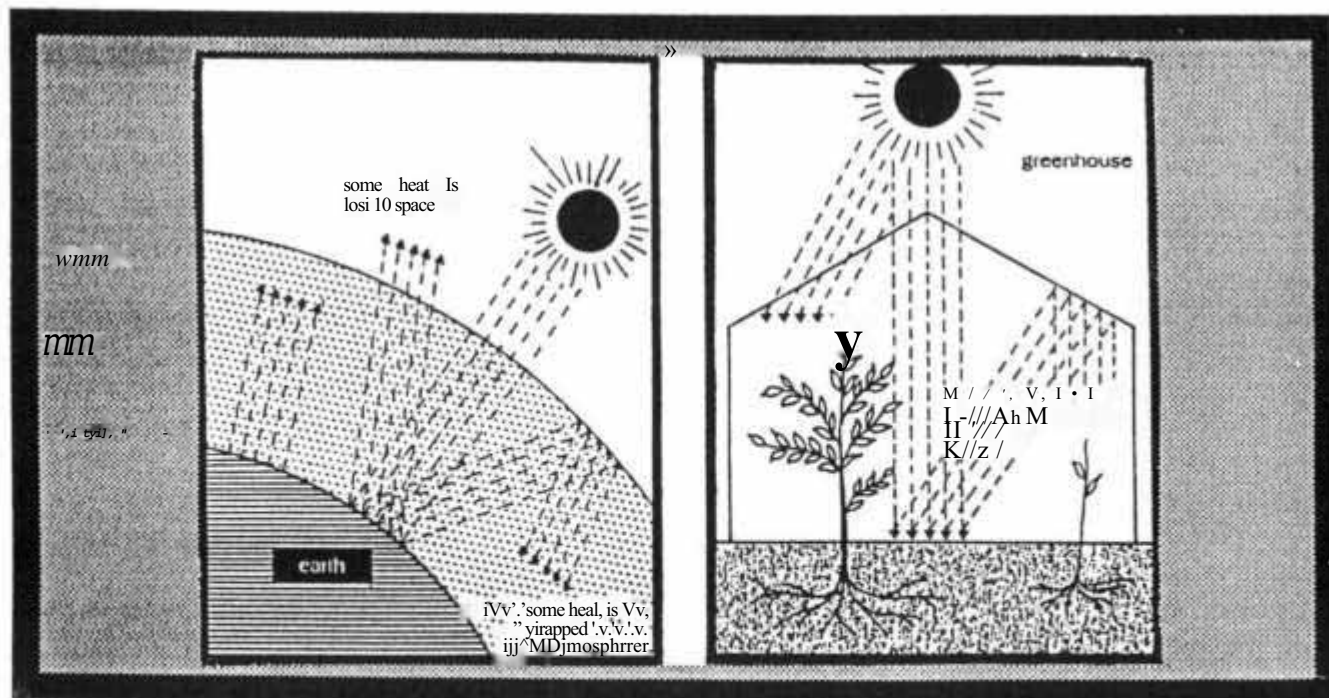


Fig 1. The Greenhouse Effect

Carbon dioxide is currently the main greenhouse gas. It is released by burning fossil fuels (coal, oil and gas) and from clearing and burning forests. The concentration of carbon dioxide in our atmosphere has increased from 275 ppm before the industrial revolution to 348 ppm today. That is by 25 per cent in a period of 150 years. Scientists are concerned that the concentration of this gas could double its pre-industrial level within the next 50 years if present rates of fossil fuel burning and deforestation continue.

While carbon dioxide is currently the most prominent greenhouse gas, the others cannot be ignored. Their concentration in the atmosphere is increasing and their contribution to the greenhouse effect is expected eventually to surpass the contribution of carbon dioxide. Additionally, the CFCs pose a threat to the ozone layer in the atmosphere which filters harmful ultraviolet rays from the sun's radiation.

It is a scientific certainty that the concentration of greenhouse gasses in our atmosphere has been increasing over the past 150 years and is likely to increase more and more rapidly as we clear forests, urbanise and industrialise. What is uncertain are the effects of this. Global warming is another scientific fact. In the last 100 years the earth has warmed by about 0.5°C. This may not seem a lot but it is significant in the context of a 5°C warming over 15,000 years following the last ice age. What scientists are now predicting is an even faster rate of global warming as the concentration of greenhouse gasses increases. The prediction of some prominent scientists is that as carbon dioxide levels double there will be a consequential increase in global mean temperature of between 1.5 and 4.5°C.

What a rise in global mean temperature means to overall climate patterns is very uncertain. Temperature changes will not be uniform between the Poles and the Equator and their effects on rainfall are unpredictable. For example, increasing temperatures over the Pacific Ocean could result in increased evaporation rates and cloud formation. Could this increased cloud coverage have a cooling effect which balances the greenhouse temperature rise?

It must be kept in mind that climate change is a very complex phenomenon. It will be driven not only by the Greenhouse Effect but by other changing factors such as ocean and atmospheric circulation patterns. Our scientists need more time to reach an understanding of the interaction between all the

relevant factors before they are able to predict future climate change with any accuracy. This is particularly the case with predicting regional changes as opposed to mean global changes.

Why Sea-levels Will Rise

Mean sea-levels in our oceans are constantly changing. The major current trend is for sea-levels to be rising, though in some locations they appear to be falling.

One of the difficulties we experience in measuring sea-level is finding a datum from which to take the measurement. For hundreds of years we have been measuring tides using tide gauges which relate sea-level to some datum point on the land at the place of measurement. The difficulty with this style of measurement is that natural tectonic movements of the Earth's crust causes the datum to move slowly over time. In the Pacific we know that some islands are rising while others are sinking. These movements are very slow in the mid-Pacific but can be of significance towards the edges of tectonic plates; that is, in locations such as the Solomon Islands, Vanuatu, the Tonga Trench and New Zealand.

The Australian continent is tectonically stable and provides a usefully datum from which to measure sea-levels. Records over the last 100 years indicate that the average rate of sea-level rise around the Australian coast-line is 1,2mm per year².

There are various potential causes of sea-level rise and various mathematical models used by scientists to explain and predict it. The most obvious of these relates to the thermal expansion of the surface ocean layer as global warming brings about rising temperatures in these waters. Some such models predict that a three degree Celsius mean global temperature rise could cause an average 200mm sea-level rise due to thermal expansion. This rise would not be uniform across all the oceans and could be as high as 300mm in some Pacific regions. Other possible causes of sea-level rise include the melting of mountain glaciers and polar ice sheets.

There are various mathematical models used by scientists to explain and predict sea-level rise. The most obvious of these relates to the thermal expansion of the surface ocean layer as global warming brings about rising temperatures in these waters. These models predict that a 3°C mean global temperature rise

could cause an average 200mm sea-level rise. This rise would not be uniform across all the oceans and could be as high as 300mm in the Pacific region. Glacial melting is not expected to make a major contribution to sea-level rise. The estimate is about 30mm for a 3°C global temperature rise, bringing the total estimate of sea-level rise during the period over which the global mean temperature rises 3°C, to 330mm or one-third of a metre.

Expert Predictions

The UN established an International Panel (of experts) on Climate Change in 1988 with three working groups. A recent assessment of IPCC Working Group 1, which had responsibility for scientific analysis, was that if there was no change in the trend of greenhouse gas production (what they referred to as "business-as-usual") global mean temperatures would increase by about 1°C by the year 2030 and sea-levels would rise by about 200mm over the same period. They also predicted a 3°C mean temperature rise under this scenario before the end of the next century together with a 650mm sea-level rise above its current level⁴.

What needs to be kept in mind is that there is a great deal of uncertainty about these predictions. The scenario of "business-as-usual" might be too pessimistic. Also, there could be time lags between greenhouse emissions and doubling of gas concentrations, or between doubling of greenhouse gas concentration and changes in climate, or between changes in climate and resultant sea-level rise. All predictions are therefore open to much uncertainty and should be looked at as a basis for policy formulation and long-term planning while we wait more scientific research and greater certainty in our knowledge of the workings of our global climate.

Sea-level Rise Trends

As already mentioned, the average trend in sea-level rise around the Australian coastline is 1.2 mm per year. Similar measurements across North America and Europe lie between 1 and 1.5 mm per year. Consequently, oceanographers believe that they know what has been happening to sea level over recent decades and consider that a good planning guidelines for the current trend is a rate of sea-level rise of 1.5 ± 0.5 mm per year.

What this tells us is that if this rate of sea-level rise continues, it will take more than 300 year for the sea-level to rise a half metre. Clearly then, the predictions of scientist that this order of sea-level rise will occur before the end of the next century means that they expect the rate of sea-level rise to increase.

It is interesting to look at a graph of historical sea-level data and future predictions of sea level, to see how existing trends will have to change for the predictions to come true. Such a graph has been provided by Professor G.W. Lennon, Professor of Oceanography at the Flinders University of South Australia, and is reproduced at Figure 2.

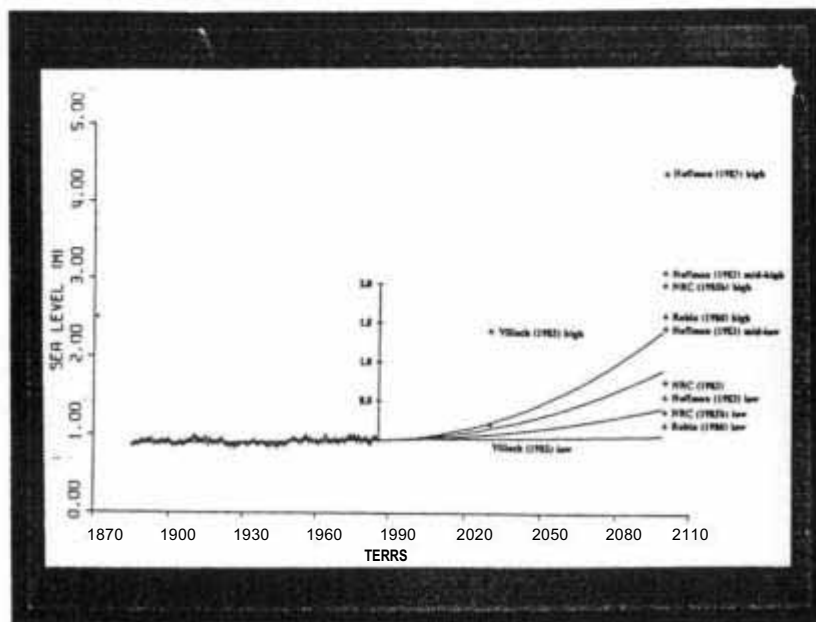


Fig 2. Observed And Projected Mean Sea-level In Fort Denison - Sydney Harbour

Clearly, some of the early predictions about sea-level rise look to be extremely pessimistic and unlikely to eventuate. They would require a dramatic and immediate change to occur in the trend line. The less dramatic predictions are much more likely to occur but still demand sound and purposeful policymaking and planning by authorities in all countries.

The Future For Pacific Atolls

The sea-level rise implications of the Greenhouse Effect are naturally of concern to the people who inhabit the coral atoll islands of the Pacific. The 'greenhouse' is no longer open to question, it is a scientific fact. Global warming is not open to question either. Nor is the fact that sea-levels are rising. What is open to question is by how much and how soon the current rate of global warming and sea-level rise will change.

What we have at the moment is a theory as to why our global climate could get warmer more quickly than the current warming rate and a theory about why sea-levels could begin to rise more quickly than they are at the moment. Additionally, scientists are developing mathematical models that allow us to project into the future and predict what conditions could be like.

It is human nature that our attention is drawn to the more sensational predictions. These are the staple diet of the news media and those who want to exploit sensationalism to draw attention to themselves.

It is now possible to state with certainty that the sea-level is rising. What is uncertain is the time frame within which significant changes will occur. If the current rate of rise continues, the sea-level will rise by half a metre over the next 300 years. If the Greenhouse Effect accelerates this rate of rise, the IPCC prediction is that this half metre rise could occur within the next 100 years. Predictions such as a one metre rise over the next 40 years can be considered as little more than scare mongering.

The comforting thing is that recent sea-level records do not show that any acceleration in the rate of rise has commenced. It is essential, however, that scientists intensify and improve their monitoring techniques, so that we obtain the earliest possible warning of changes. At the same time it is prudent and proper for national leaders and planning authorities to act rationally in regard to these matters. There is no cause for hysteria but there is a need to recognise that changes are occurring to our environment and that communities need to adjust to these changes.

Wise leadership and good management will ensure that communities respond appropriately to change. Good and timely information is the necessary prerequisite for good management. It is therefore essential for community leaders in the atoll islands to stay informed about climate change, sea-level rise and other physical effects of the greenhouse. It is also important for them to differentiate between sound scientific information and interpretations designed to stimulate reaction and to sensationalise the issue.

Close scientific monitoring of our changing environment is essential and will provide the data from which informed predictions can be made. Present indications are that changes are happening, but at a rate that is slow enough for us to respond in a considered, controlled, appropriate and sustainable manner.

References:

¹Australian and New Zealand Environment Council 1990. **Towards a National Greenhouse Strategy for Australia - A Summary Report**, p.1

²GW Lennon, Flinders Institute for Atmospheric and Marine Sciences.
Private correspondence with JB Blake, AODRO, 1 May 1989.

³ Klaus Wyrski Review article - **Sea Level Rise: the facts and the future** Pacific Science vol. 44, January 1990

⁴ **Climate Change - The IPCC Impacts Assessment. Report** prepared for IPCC by Working Group II. WM01990, p.1.

CLOSING REMARKS

*Mr Luke Paeniu, Assistant Secretary, Ministry of Health and Human Resources
Development*

Mr Chairman, Representatives of the Australian Overseas Disaster Response Organisation and the Pacific Regional Delegation of the League of Red Cross and Red Crescent Societies, and Participants:

I wish to congratulate everyone on the success of the workshop on behalf of the Tuvalu Government. The workshop had achieved its aims and you have gained a greater understanding of the role of NGOs in disasters and had given a foundation on which they could plan for the future.

I am happy to be informed that the paper presentation has been excellent and the participation has been extremely good. I am extremely hopeful that the workshop will prove to be a fruitful one.

I can see its success in bringing together people from different NGOs and Government, to talk together for the good of all people in Tuvalu.

This workshop had been very valuable and the Government of Tuvalu would give close attention to its recommendations.

I urge NGO participants to spread the knowledge you have gained to your individual organisations. Your help is needed in disaster preparedness and relief. The Government could not do it all. Indeed, in some areas the NGOs were better equipped and trained to help than the Government.

I would like to take this opportunity to thank the Australian Disaster Response Organisation, the Pacific Regional Delegation of the League of Red Cross and Red Crescent Societies, and the Tuvalu Red Cross Society, for arranging the workshop.

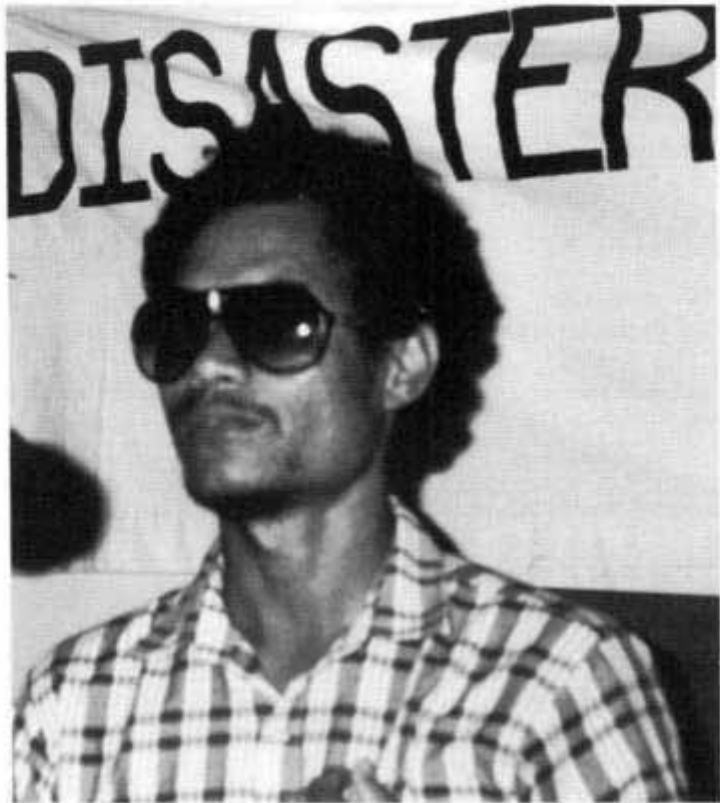
To the Chairman of the Organising Committee, Mr Hopi Toloa, I congratulate you in your untiring effort exhibited prior to, and for the duration of this workshop in making it a memorable and fruitful episode for those who attended it.

To the participants, I wish you all success in your role as disseminators.

To members of the Training Team, I hope that you return with pleasant memories of our beautiful country and we hope that you would one day return to visit us to conduct a similar workshop.

With that I officially declare close this Workshop on Disaster Preparedness.

Thank you.



WORKSHOP DELIBERATIONS

Introduction

Thirty-one NGO and Government personnel participated in the three day workshop, the first of its kind for Tuvalu.

Tuvalu has a National Disaster Plan which comprises part of the Government's Administrative Orders (GOA). It has been under consideration for some time to remove the Plan from the GOA and develop it as an independent document in the public domain. Currently the Plan deals almost exclusively with cyclones.

In 1990, the Tuvalu Red Cross Society approached AODRO for assistance in conducting a workshop on disaster preparedness, and the disaster plan in particular, for NGOs with Government representation as well.

The workshop's coordinator, Mr Hopi Toloa, Disaster Officer of the Tuvalu Red Cross Society was assisted by AODRO's Executive Director, Mr Barry Blake, the Information Officer, Mrs Lynne Ali and the Pacific Regional Delegate of the League of Red Cross and Red Crescent Societies, Mr Xiaohua Wang.

Objectives

The workshop's objectives were:

2. To review the disaster hazards to which Tuvalu is exposed.

The primary threats to Tuvalu are climatic ones. Presentations on cyclones and the Greenhouse Effect provided the participants with an overview of natural hazards likely to affect Tuvalu.

2. To become familiar with the details of the National Disaster Plan

The National Disaster Plan was reviewed in depth with sections being studied by syndicate groups each day, who would then present a summary of their findings during plenary discussions.

3. To review the roles of NGOs in disasters with a view to integrating NGOs into the Plan.

Presentations were given on the roles of NGOs during the phases of the disaster cycle, as well as their potential role in public awareness programs and the significant role of the Red Cross during emergencies. During their discussions, participants suggested ways in which NGOs could be realistically integrated into the Plan. These suggestions were compiled for distribution to the National Disaster Committee.

4. To make recommendations regarding ways and means of developing NGO capabilities to assist with disaster management.

These recommendations appear below:

Recommendations

- * that the proceedings and recommendations of this workshop be considered by Government.
- * that amendments proposed and recommended to the National Disaster Plan by this workshop be considered for implementation by Government.
- * that the Government prepares a plan for other disaster threats such as epidemics and air/sea accidents.
- * that the NDC should meet every two months, to plan for any disasters, and report directly to cabinet their recommendations.
- * that the Government looks into building a permanent Disaster Emergency Control centre.

- * that the Government appoints a working committee to raise funds for disaster relief activities and that the NDC be responsible for this disaster fund.
- * that sufficient disaster relief supplies should be stockpiled at all times.
- * that technical and management training for key people who are directly involved with disaster management be arranged.
- * that a survey be carried out to assess whether houses in Tuvalu are disaster-resistant. And that at the same time, an ongoing project of improving housing according to disaster-resistant standards be implemented.
- * that a public awareness program be encouraged because education on disaster preparedness at all levels is a must.
- * that as part of a public awareness program, the participants of this workshop should organise activities to raise awareness about disasters.
- * that a follow-up workshop be held in the near future
- * that similar workshops are held more regularly covering manmade disasters as well
- * that workshops at island level be undertaken

Conclusion

The workshop was, by all accounts, a success. While Tuvalu is fortunate in not having a history of disasters, those events that have impacted have been devastating. And more and more the people of Tuvalu, rightly or wrongly, look to the future with trepidation as they ponder what the Greenhouse Effect will bring for them. Likewise the increasing encroachment of man made threats, particularly transport accidents and ecological disasters, is becoming apparent to them. It is important then that Tuvalu has a viable National Disaster Plan that incorporates one of their greatest assets the NGOs.

At the closing session, representatives of the various groups present during the workshop provided not only their group's recommendations, which have been distilled above, but also gave a vote of thanks to the organisers and the training team for a job well done. During this session, Mr Nalei Paka, the Senior Medical Assistant at the Tuvalu Maritime School, took the opportunity to sum up how his organisation could be beneficial to a disaster effort. It is published here largely because it exemplifies the participants' willingness to participate and also their increased understanding of disaster management and the role they can play in the future. It provides a fitting conclusion to this report:

The Tuvalu Maritime School

"We have a large group of fit and healthy young men all with training in first aid. This is valuable and practical training. The Tuvalu Maritime School continuously upgrades its training. All disaster work would be carried out in organised groups with an experienced officer to command and help coordinate.

We have a large amount of useful equipment always ready for use such as: boats, outboard motors, first aid equipment, fire fighting equipment, pyrotechnics, different sizes of knives, ropes, axes and hand tools that are all ready to respond very quickly. We have a separate electricity supply, a separate supply of petrol and diesel and well maintained buildings which could be utilised for hospital accommodation.

Finally we say, thank you for sharing your knowledge and experience with the people of Tuvalu. *Fafetai Fasifasi*. We hope that we will never have to put this knowledge to use. But if the worst happens then, thanks to you we will be able to cope and hopefully prevent serious loss of life amongst our people. We all feel safer knowing that if a disaster falls upon these islands that you are friends of Tuvalu and will be willing to assist us in our time of need.

Once again I say *Fafetai Fasifasi*".

Participants

Name	Position	Organisation
NGOs		
Rev Puafitu Faaalo	General Secretary	Tuvalu Christian Church
Rev Ioane Peleti	Director of Communication	Tuvalu Christian Church
Miss Oiliula Panapa	Women's Secretary	Tuvalu Christian Church
Mr Tebaukie Paape	Chairman	Nui Youth
Mrs Moia Tine	Representative	Muslim Mission
Mrs Selotia Temalie	Secretary	Tuvalu Pre-School Council
Mr Geoff Jackson	Missionary	Jehovah's Witnesses
Mr Saitala	Tusi representative	Masaua Organisation
Mrs Suliana Seluka	President	Tuvalu Women Council
Mrs Katalaina Malua	Secretary	Tuvalu Women Council
Mrs Siuila Toloa	Secretary General	Tuvalu Red Cross Society
Miss Koling Ene	Welfare Worker	Tuvalu Red Cross Society
Miss Lino Fiapati	Welfare Worker	Tuvalu Red Cross Society
Mrs Sunema Makatui	Field Officer	Tuvalu Red Cross Society
Mr Kafolau Bruce	Volunteer	Tuvalu Red Cross Society
Mrs Susana Taafaki	Volunteer	Tuvalu Red Cross Society
Dr Tiliga Pulusi	Medical Officer	Bahai'i Faith
Mr Laisini Papamau	Representative	Chamber of Commerce
Mrs Mileta T Akelisi	Clerk/Typist	Tuvalu Health Association
Mrs Kausele Moresi	Pre School Organiser	Tuvalu Girl Guides Assoc.
Mr Talatea Boreham	Chairman	National Youth Council
Mrs Penieli Metia	Programme Coordinator	Tuvalu Family Health Ass.
Government		
Mr Fakavae Taomia	Scientific Officer	Tuvalu Meteorological Service
Mrs Tia Tau	Presenter	Radio Tuvalu
Mrs Misalaime Nelesone	Assistant Secretary General	Office of the Prime Minister
Mr Tagisia Kilei	Senior Radio Operator	Telecom Division
Dr Lupasi Kaisala	Physician	Princess Margaret Hospital
Mr Robertson Titi Dei	Civil Aviation Adviser	Ministry of Labour, Works and Communication
Sgt Willy Telavi	Police Officer	Police Headquarters
Mr Nalei Paka	Senior Medical Assistant	Tuvalu Maritime School
Training Team		
Mr Hopi Toloa	Disaster Officer	Tuvalu Red Cross Society
Mr Barry Blake	Executive Director	AODRO
Mrs Lynne Ali	Information Officer	AODRO
Mr Xiaohua Wang	Pacific Regional Delegate	LRCRCS

Guests At The Opening Ceremony

Name

Hon Bikenibeu Paeniu	Prime Minister of Tuvalu
Mrs Foketi Paeniu	President, Tuvalu Red Cross
Hon Dr Alesana K Seluba	Deputy Prime Minister and Minister of Finance, Commerce and Public Corporations
Rev Morikao Kaua	Chairman, Tuvalu Christian Church
Mr Robertson Titi Die	Civil Aviation Adviser, Ministry of Labour, Works and Communications
Mr Luke Paeniu	Assistant Secretary, Ministry of Health and Human Resources Development
Dr Teleke Kofe	Acting Director of Health, Princess Margaret Hospital
Mr Enele Sopoanga	Secretary Foreign Affairs and Economic Development
Mr Penehulo Hauma	Director of Education
Mr Evi Taua Ag.	Inspector, Tuvalu Police Force
Mrs Telele Peleti	Vice President, Tuvalu Red Cross
Mr Pafini Nouata	Director, USP Extension Centre



Participants at the 1991 Disaster Preparedness Workshop

Program

MONDAY -14 October 1991

OPENING SESSION: Chairman Mr Hopi Toloa, Disaster Officer, Tuvalu Red Cross Society

3:00 pm	Opening prayer	Rev.Morikao Kaua President, Tuvalu Christian Church
	Welcoming address	Mrs. Siuila Toloa, Secretary General, Tuvalu Red Cross Society
	Opening address	The Hon. B. Paeniu, Prime Minister of Tuvalu
	Introduction to thr Workshop	Mr. Barry Blake, Executive Director, AODRO
4:00 pm	Refreshments	

TUESDAY -15 October 1991

8:00 - 8:30 am	Registration	
8:30 - 9:10 am	A Short History of Disasters in Tuvalu	Mr. Hopi Toloa, Disaster Officer, TRCS
9:20-10:00 am	Tropical Cyclones and Warning Systems	Mr. Fakavae Taomia, Scientific Officer Meteorological Department
10:00-10:30 am	MORNING TEA	
10:30-11:10 am	Introduction to Disaster Management	Mr. Barry Blake, Executive Director, AODRO
11:20-12:00 noon	Tuvalu Government National Disaster Plan (Ch.22.1)	Mrs Misalaima Nelesone, Asst. Secretary Office of the Prime Minister
12:00-1:00 pm	LUNCH	
1:00 - 1:40 pm	Typical NGO Roles in Disasters	Mrs Lynne Ali, Information Officer, AODRO
1:50 - 2:30 pm	The Role of the Red Cross in Disasters	Mr. Xiaohua Wang, Regional Delegate for Pacific, LRCRCS
2:30-3:00 pm	AFTERNOON TEA	
3:00 - 3:40 pm	Small group discussions on roles and responsibilities	
3:50 - 4:30 pm	Reports from small groups	

WEDNESDAY 16 October 1991

8:30-9:10 am	Control and Coordination of Disaster Operations	Mrs. Lynne Ali, AODRO
9:20-10:00 am	Small group discussions	
10:00-10:30 am	MORNING TEA	
10:30-11:10 am	Emergency Operations	Mr Barry Blake, AODRO
11:20-12:00 noon	Small group discussions	

12:00-1:00 pm	LUNCH	
1:00-1:40 pm	Recovery operations and their linkage with disaster mitigation	Mr Barry Blake, AODRO
1:50-2:30 pm	Small group discussions	
2:30-3:00 pm	AFTERNOON TEA	
3:00 - 3:40 pm	Introduction to Community Education and counter disaster training	Mrs. Lynne Ali, AODRO
3:50 - 4:30 pm	Small group discussions	

THURSDAY 17 October 1991

8:30-10:00 am	Seminar on "Greenhouse Effect"	
	Introduction to the Greenhouse Effect	Mr Fakavae Taomia
	Understanding sea-level rise predictions for Pacific atolls	Mr Barry Blake
10:00-10:30 am	MORNING TEA	
10:30-12:00 noon	Examine National Disaster Plan in light of past two days' discussions	Mr Barry Blake
12:00-1:00 pm	LUNCH	
1:00 - 2:00 pm	Prepare workshop recommendations	Mr Hopi Toloa
2:30 - 3:00 pm	AFTERNOON TEA	
3:00 - 4:00 pm	CLOSING SESSION	
	Speeches:	
	- Workshop Coordinator	Mr Hopi Toloa
	- Participants:	
	- Government	Dr. Iupasi Kaisala
	- Churches	Rev Ione Peleti
	- Women's Group	Miss Suliana Seluka
	- Tuvalu Red Cross	Mrs Penieli Metia
	- Tuvalu Maritimi School	Mr Nalei Paka
	- Training Team	Mr Barry Blake, AODRO
	Closing Remarks and Presentation of Certificates	Mr Luke Paeniu Asst. Secretary Ministry of Health and Human Resources Development.
	Closing Prayer	Rev Puafitu Faaalo Tuvalu Christian Church
