

REPORT ON

FEBRUARY/MARCH/APRIL 2007 FLOOD AND TROPICAL CYCLONE CLIFF: NORTHERN, EASTERN AND WESTERN DIVISION



TC Cliff operational track produced by FMS.

Flooded Nadi Town during March Flood



Flooded Nadi River and the main street of Nadi Town

Prepared by: National Disaster Management Office, 2007.

1.0 INTRODUCTION:

There has been an increase in extreme climatic events such as flash-flooding, drought and intense tropical cyclone happening across the globe. Climate scientists have made prediction that the frequency and impacts of hydro meteorological hazards will continue to increase. The increase in frequency and impacts of hydro meteorological hazards is believed to be linked with Global Warming where developing countries like Fiji are likely to be adversely affected. This is because majority of the population are poor and vulnerable to disasters.

The weather pattern affecting Fiji is now changing and this may be attributed to the impacts of global warming that disrupt our weather patterns. In the past flooding always accompanied by the passage of tropical cyclone, however there has been an increase in flash flood generated from tropical depression and low pressure system costing the government of Fiji millions of dollars.

The 2004 flash flood that affected the Western and Central Division cost the government estimated **\$US11, 585,392.00** and 10 lives were lost. This is a concern as tropical depressions and low pressure systems are generating more costs compared to cost generated by tropical cyclone for example tropical cyclone Cliff cost the government around **\$6Million** Fijian dollars.

Apart from global warming other contributing factors that enhance the impacts of disasters include deforestation, poor land use management, increase population growth in urban centers and poor urban planning and development.

This report outlines the cost of destruction done by the flood that affected the Western and Northern division and all the damage done by tropical cyclone Cliff in some parts of Vanualevu.

2.0 BACKGROUND:

According to the Fiji Islands Climate Outlook for the month of November 2006, produce by Fiji Meteorological Service, a weak El Nino had already developed and was likely to strengthen to a moderate event during 2007. Historical analysis of tropical cyclones affecting Fiji shows that during El Nino there is a higher chance of cyclone affecting Fiji. Other extreme climatic events such as drought also occur during El Nino for example the 1997-1998 droughts.

During 2007, tropical cyclone Cliff together with the three flood events was the main significant hydro meteorological hazards that affected Fiji. The table below shows the events happened and the areas affected.

N0	Event	Date	Areas affected
1	Flood	9 th -12 th February 2007	Lautoka and Nadi Urban Centres.
2	Flash-Flood	9 th -11 th March 2007	Rakiraki in the Western Division, Macuata district in Northern Division
3	Flood	24 th -25 th March, 2007	Tavua to Nadi in the W/D, Macuata and Ckaudrove in the N/D, Korovou,

			Rewa and Navua district in the Central Division
4	Tropical Cyclone Cliff	4 th -6 th April, 2007	Parts of Lau Group in the E/D and Macuata and Cakaudrove in the N/D.

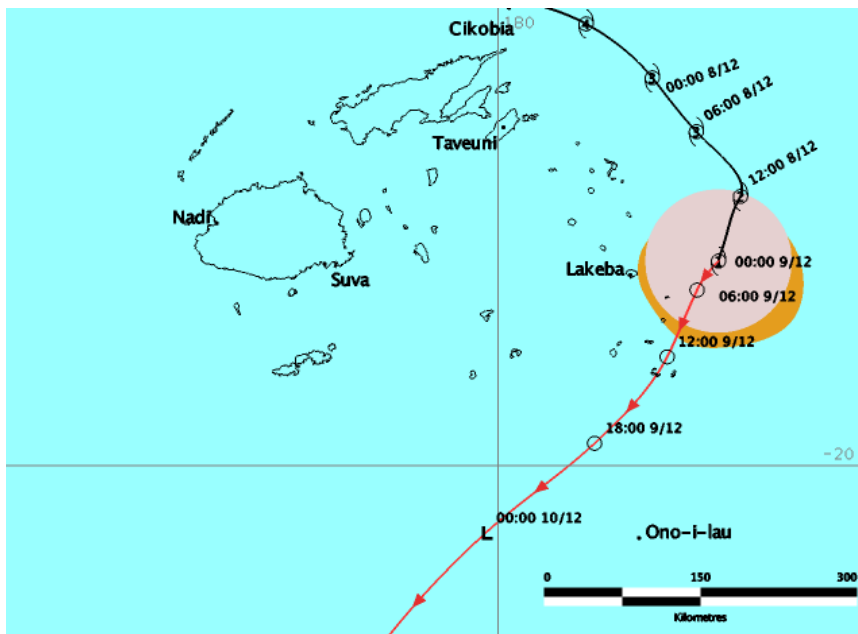
It is to be noted that the first major flood in 2007 of 04 February left a trail of devastation in Macuata and Cakaudrove particularly the Tikina Vaturova and was the subject of Cabinet Decision No. 120 of 20 March 2007 whereby Cabinet approved the release of funds totaling **\$2,195,039** from the Disaster Relief and Rehabilitation Fund for relief and rehabilitation work. The distribution of financial grants on housing, household and crop losses and one month food ration to the affected people have been completed and Commissioner Northern's Office is closely monitoring housing rehabilitation work.

The wet weather conditions experienced during the first quarter continued into April, with frequent heavy rainfall experienced in certain areas. The passage of two active weather systems and Tropical Cyclone Cliff brought significant heavy rainfall to parts of Viti Levu and Vanua Levu, Taveuni and the Lau Group resulting in flooding and damage mostly to crops in these areas. Parts of Viti Levu and Vanua Levu experienced flooding in March and early April. The continuing wet weather conditions had a major impact on Fiji roads which continued to deteriorate much to the disappointment of motorists and the travelling public.

A tropical disturbance located to the northwest of Fiji moved towards the country along a slow moving trough of low pressure on April 1st. The disturbance

developed into a Tropical Depression on April 2. It intensified further to be named TC Cliff on April 4, when it was just east of Udu point. At this point the system had winds estimated at 40 knots close to the centre. TC Cliff then tracked southeast through the Lau Group, moving away from Fiji late on April 5. During the passage of TC Cliff, damaging gale force winds affected the eastern parts of Vanua Levu, Taveuni, and nearby smaller islands, as well as islands in the Lau Group. Rainfall was heavy and widespread with notable 24-hour falls of 132 mm at Udu point, 110 mm at Matei and 190 mm at Lakeba on April 4. Fortunately TC Cliff was not a destructive cyclone otherwise it would have caused great socio-economic disruptions to the country.

The track of TC Cliff during its passage through the Fiji Group



Although the prolonged heavy rainfall was the triggering mechanism of floods, blocked drainage system and heavy siltation of major catchments further compounded the flooding situation in the affected areas.

4.0 ACTIVATION OF DISMAC SYSTEM

As usual all Emergency Operation Centres at all levels were put on alert and those in the affected areas in the four divisions were subsequently activated to monitor the disaster situation, provide general advice to the public on precautionary measures to be taken to safeguard life and property, coordinate emergency operations, manage evacuation centres, and respond to the needs of the affected people. The Department of Provincial Development through the National Disaster Management Office (NDMO) co-ordinated DISMAC operations in conjunction with the relevant Divisional Commissioners and response agencies.

5.0 PUBLIC ADVISORIES

NDMO continued to issue public advisories on regular intervals to the various media outlets warning the community of the impending threat and for them to take necessary precautions. This was supported by general advice given to the public by divisional and district offices.

It was evident that some people did not pay heed to the public advisories and warnings that resulted in the loss of three lives in Batinikama and Bulileka in Macuata district as they attempted to cross flooded rivers and got swept away by strong currents.

6.0 EVACUATION CENTRES

Evacuation centres were activated in the Northern, Western and Central Division with the evacuees staying very briefly only to seek shelter for the night. Food ration was distributed to some evacuation centres in the Northern and Central Division however in the Western Division ration was not provided to the

evacuees as they had prepared themselves well before turning up at the evacuation centres. Refer Appendix 2 for details.

8.0 SEARCH AND RESCUE

Two boats, Taitiki carrying 43 passengers bound for Naviti and Marama ni Yalobi with 18 passengers destined for Waya Island left Lautoka on Sunday morning, 25/3/07. The Taitiki capsized on the way and hotel management and workers of Kuata Island Resort rescued all passengers who were billeted at the hotel for the night. They were transported back to their villages on board the Marama na Sau on Monday 26/3/07. The Marama ni Yalobi sheltered at Vomo Sheraton on Sunday 25/3/07 and left on Monday morning for Yalobi village. Kuata Island Resort did a marvellous job in rescuing and saving the lives of all 43 passengers on board Taitiki under atrocious weather condition and had been commended for their efforts. The resort's claim amounting to \$3,045.00 was reimbursed to them.

9.0 CASUALTIES

The March 10 flood claimed the lives of three (3) people in Labasa as a result of drowning as they tried to cross flooded rivers and was swept away by strong currents. Refer Table 1 for details.

Table 1: Casualties

Name	Age	Sex	Cause of Death	Race	Residence	Division
1. Nazima Bi	29	Female	Drowning	Indian	Bulileka	Northern
2. Rohit Prasad	21	Male	Drowning	Indian	Batinikama	Northern
3. Gaya Prasad	45	Male	Drowning	Indian	Batinikama	Northern

10.0 FLOOD AND TC CLIFF IMPACT

The impacts of three flooding events during the first quarter and TC Cliff in early April in the four divisions are highlighted below:

10.1 WESTERN DIVISION FLOODS 09th -12th FEBRURAY, 2007.

Flooding concentrated along the Nadi-Lautoka corridor and those living along the banks of the Nadi river were the most vulnerable and suffered minimal damage to crops and household items. Shop owners suffered as a result of loss of goods and services however damage sustained by the business community could well be recovered from insurance claims. There was little damage to crops, sugar cane and houses as supported by the recommendation from Commissioner Western that no assistance should be provided in this areas. The impact of flood on health and education was insignificant.

Damage sustained by infrastructures like roads, crossings and water supply was the result of the cumulative effect of the inclement weather prevailing throughout the 2006/2007 cyclone season. The media and bus companies in particular have continued to draw the attention of the authorities concerned at the deplorable state of roads in the affected areas and the need to make immediate improvement to the road infrastructures. Given the need for increased mobility and access to market and service facilities, it is critically important that the road infrastructures in the affected areas are restored as soon as practicable.

The Ministry of Transport, Works and Energy is making a separate submission to Cabinet on infrastructural rehabilitation/upgrading for damages caused by floods and landslides.

The total cost of damage to the infrastructure and social sectors caused by this flood in the Western Division is estimated at \$2,985,989.00. The details are shown in Table 2.

Table 2: Cost of Damages – Infrastructure and Social Sectors (February Flood)

Category	Ra	Tavua/Nadari	Ba	Lautoka	Nadi	Nadroga/Navo	Total (\$)
1. Infrastructure							
(a) Road	0	0	0	0	0	\$299,860	\$299,860
(b) Crossing	0	0	\$400,000	0	0	0	\$400,000
© Transformer	0	0	\$50,000	0	0	0	\$50,000
(d)(Non-PWD Rd	\$80,000	\$80,000	\$50,000	\$50,000	\$80,000	\$220,000	\$560,000
(e)Non-Cane Access Road	\$40,000	\$30,000	\$20,000	\$20,000	\$80,000	\$80,000	\$270,000
(f)Cane Access Road	\$90,000	\$45,500	\$150,000	\$120,000	\$95,000	\$40,500	\$541,000
2. Social							
(a) Housing	0	0	0	0	0	0	0
(b)Household Items	0	0	0	0	\$498,234	0	\$498,234
© Crops	0	0	0	0	\$286,895	\$80,000	\$366,895
TOTAL	\$210,000	\$155,500	\$670,000	\$190,000	\$1,040,129	\$720,360	\$2,985,989

10.2 FLASH FLOOD 9TH MARCH 2007

The flash flood was experienced mostly in the Rakiraki district. Sections of Vaileka town were flooded as the river burst its banks but shop owners were ready and goods were saved from the ensuing flood waters. Traffic was disrupted for several hours as the road network and bridges in the district were closed to traffic.

Three evacuation centres were activated and evacuees stayed in the centres only for the night and left for their homes the next morning. No ration was issued to the evacuees as they had prepared themselves before moving into the centres for shelter.

Damage to crops especially cassava was evident however it was not as devastating as that experienced in the Northern Division and the situation did not necessitate issuance of food ration to those affected. A house was threatened by landslide, which was cleared by a digger; otherwise there was little damage to houses.

Cane access and rural roads sustained considerable damage. The costs of upgrading these roads are included in Table 2 above.

10.3 TROPICAL DEPRESSION AND FLOOD MARCH 24TH -25TH 2007.

Continuous heavy rain was experienced from late Saturday night 24 March to the early hours of Sunday 25 March, 2007 as a result of a Tropical Depression that brought heavy rain to most parts of the country.

The affected areas stretched from Tavua to Nadi, with Nadi town and surrounding areas the worst affected. Several sections of the road network in the division were affected by flood waters and closed to traffic for several hours. Flood waters however quickly receded in several places and roads were back to normal operation.

Three evacuation centres were activated with two vacated by evacuees after one night as they returned home but 8 families at the Coronation Church Hall stayed there for almost three days. No ration was provided to the evacuees as they had prepared themselves well before moving to the evacuation centres.

Although the flood impact was not destructive however there were damages to crops like cassava, banana and dalo and also household items and groceries. Infrastructures such as roads and crossings particularly in the Navosa and Nadi areas sustained damages.

The cost of damage to the social and infrastructure sectors caused by this flood in the Western Division is estimated at \$631,827 as summarized in Table 3.

Table 3: Cost of Damage to Social and Infrastructure Sectors (24-25 March Flood)

Sector	Ra	Tavua	Ba	Lautoka	Nadi	Nadroga	Total (\$)
1. Infrastructure							
(a) Crossing	0	0	0	0	\$90,000	\$12,000	\$102,000
(b) Non. PWD Roads	0	0	0	0	0	\$105,000	\$105,000
I Non Cane Access Road	0	0	0	0	0	0	0
(d) Cane Access Road	0	0	0	0	\$100,000	0	\$100,000
2. Social							
(a) Housing	0	0	0	0	0	0	0
(b) Household Items	0	0	0	0	0	0	0
I Crops	0	0	0	\$37,932	\$286,895	0	\$324,827
TOTAL	0	0	0	\$37,932	\$476,895	\$117,000	\$631,827

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The total cost of damage to the Western Division caused by the three flooding events of February and March, 2007 is estimated at \$3,617,816 as shown in Table 4.

Table 4: Western Division - Summary of Total Damage Costs (February/March 2007 Floods)

SECTOR	FEB 09 FLOOD	MARCH 09 FLOOD	MAR 24 FLOOD	TOTAL (\$)
1. Social:				
(i) Housing	0	0	0	0
(ii) Health	0	0	0	0
(iii) Agriculture (Crops)	\$366,895	0	\$324,827	\$691,722
(iv) Education	0	0	0	0
(v) Household Items	\$498,234	0	0	\$498,234
Total	\$865,129	0	\$324,827	\$1,189,956
2. Infrastructure:				
(i) Road	\$299,860	0	0	\$299,860
(ii) Crossing	\$400,000	0	\$102,000	\$502,000
(iii) Transformer	\$50,000	0	0	\$50,000
(iv) Non-PWD Road	\$560,000	0	\$105,000	\$665,000
(v) Non-Cane Access Rd	\$270,000	0	0	\$270,000
(vi) Cane Access Road	\$541,000	0	\$100,000	\$641,000
Total	\$2,120,860	0	\$307,000	\$2,427,860
GRAND TOTAL	\$2,985,989	0	\$631,827	\$3,617,816

11.0 NORTHERN DIVISION

11.1 Qawa River Flooding, 10 March, 2007

The trough of low pressure prevailing over the Fiji Group at the time brought heavy rainfall in the upper mountain ridges separating the two provinces of Cakaudrove and Macuata. The unexpected high rainfall in these areas caused streams to overflow and contributed to the flooding of Qawa river. This however came unexpectedly especially when the weather in Macuata at the time had been somewhat fine the whole morning. At 2.00pm in the afternoon the river already showed signs of flooding with the sudden increase in water levels and the swift water current towards the lower river end. By 4.00pm, the Qawa river broke its banks and was a major source of threat to residents and properties along the river and those within its proximity.

The Labasa Civic Centre and Sukanaivalu Barracks were activated as evacuation centres during the night of 10/3/07. Occupants were supplied with food ration by the Fiji Red Cross and Fiji Military Forces.

11.2 Tropical Cyclone Cliff, 04 April, 2007

TC Cliff originally developed as a Tropical Depression located at about 20 kms north of Udu point around 11.00am on 04 April 2007. With cyclone force winds of 90kms per hour the depression on its projected path was expected to cause major devastation to areas in Taveuni, Udu, Tawake and Natewa Bay. District Offices in Saqani, Taveuni, Savusavu and Tukavesi were rather taken by surprise at the sudden onslaught of the cyclone force winds especially given the short time between the receipt of the first warning from the National Weather

Office and the actual impact of the cyclone. This needs to be addressed further with the Department of Meteorology.

Two evacuation centres were opened in the Tukavesi district at Kama District School and Vunisaiki Primary School. Meals and refreshments were provided to the evacuees during their brief stay. A number of village halls were used as evacuation centres and managed by Turaga ni Koros.

11.3 Damage Caused by TC Cliff

The assessment carried out by the various government teams indicated that the cyclone had caused serious disruptions on the livelihood of the affected communities and root crops was the worst affected. Damages sustained by root crops in the province of Macuata and Cakaudrove involving 1,304 households are estimated at \$4,079,621 as shown in Appendix 3.

Eighteen (18) houses were completely destroyed and 92 suffered partial damage in the Saqani, Tawake, Rabi and Taveuni districts. The estimated cost of housing damage is \$142,240.00 as summarized in Appendix 4.

Seventeen (17) schools in the Macuata and Cakaudrove provinces suffered damages estimated at \$73,948.00. Refer Appendix 5 for details.

Flooding and landslides that occurred in several parts of the division also caused extensive damage to the road infrastructure. The Ministry of Transport, Works and Energy's estimate for repairs to be done on roads and associated infrastructures under its jurisdiction is estimated at \$1,870,000 as summarized in

Damage to water supply systems is estimated at \$27,081.00 as summarized in Appendix 7.

Operational cost, which involved the management of Emergency Operation Centres and Evacuation Centres, survey/assessment conducted by government teams and emergency relief totaled \$150,170.00. The details are shown in Appendix 8.

The total cost of damage caused by the March flood and TC Cliff in April, 2007 to the Northern Division in the social and infrastructure sectors is estimated at \$6,256,390 as shown in Table 5.

Table 5: Summary of Damage Costs - Northern Division

SECTOR	MARCH 10 FLOOD	TC CLIFF	TOTAL (\$)
1. Social:			
(i) Housing	0	\$142,240	
(ii) Health	0	0	
(iii) Agriculture	0	\$4,079,621	
(iv) Education	0	\$73,948	
(v) H/hold/crops- Cat 2	\$63,500		
Total	\$63,500	\$4,295,809	\$4,359,309
2. Infrastructure:			
(i) Roads	0	\$1,135,000	
(II) Non PWD Road	0	\$735,000	
(ii) Crossings	0	0	
(iii) Water	0	\$27,081	
Total	0	\$1,897,081	\$1,897,081
GRAND TOTAL	\$63,500	\$6,192,890	\$6,256,390

12.0 EASTERN DIVISION

Tropical Cyclone Cliff passed through the Lau Group on its way out of the country accompanied by heavy rainfall late on April 05, 2007. Its impact was mostly felt by root crops however according to the initial assessment by Ministry of Agriculture damage caused was minimal. Housing, water supply and infrastructural damages were insignificant. The only significant damage was caused by flooding of the Lomati District School in Lakeba which sustained damage to stationery, equipment and a teacher's quarter. Lomaiviti and Kadavu were left unscathed.

13.0 CENTRAL DIVISION

The tropical depression that brought heavy rain on 23/3/07 caused flooding in the Navua and Korovou districts where several roads were closed to traffic for several hours. The flood made little impact and quickly receded however the road condition in the division worsened. Damage to roads and bridges is being addressed by Ministry of Transport, Works and Energy in a separate Cabinet submission.

14.0 SUMMARY OF SECTORAL DAMAGE COST: BY DIVISION

The total cost of damage sustained by the various sectors in the Northern and Western Division caused by floods and TC Cliff is estimated at \$9,874,206 as shown in Table 6 below:

Table 6: Summary of Sectoral Damage Cost (By Division)

SECTOR	NORTHERN	WESTERN	EASTERN	CENTRAL	TOTAL (\$)
1. Social:					
(i) Housing	\$142,240	0	0	0	\$142,240
(ii) Health	0	0	0	0	0
(iii) Agriculture	\$4,079,621	\$691,722	0	0	\$4,771,343
(iv) Education	\$73,948	0	0	0	\$73,948
(v) Household items	\$63,500	\$498,234	0	0	\$561,734
Total	\$4,359,309	\$1,189,956	0	0	\$5,549,265
2. Infrastructure:					
(i) Roads (PWD)	\$1,135,000	\$299,860	0	0	\$1,434,860
(ii) Roads (Rural)	\$735,000	\$665,000	0	0	\$1,400,000
(ii) Crossing	0	\$502,000	0	0	\$502,000
(iii) Transformer	0	\$50,000	0	0	\$50,000
(iv) Non-Cane Access Rd	0	\$270,000	0	0	\$270,000
(v) Cane Access Road	0	\$641,000	0	0	\$641,000
(ii) Water	\$27,081	0	0	0	\$27,081
Total	\$1,897,081	\$2,427,860	0	0	\$4,324,941
3. Economic:					
(i) FSC	0	0	0	0	0
(ii) Local Govt	0	0	0	0	0
(iii) Chamber of Comm	0	0	0	0	0
GRAND TOTAL	\$6,256,390	\$3,617,816	0	0	\$9,874,206

15.0 RELIEF AND REHABILITATION NEEDS

Following the February 2007 flood in the Northern Division, Cabinet approved amongst other things (Cabinet Decision No. 120 of 20/3/07) two categories of relief and rehabilitation assistance, viz:

Category I – Provision of financial grants to those living within the Labasa urban and peri-urban areas for crop damage \$300 and for household items and school material - \$400

Category II – Provision of financial grants to those whose homes were either completely destroyed, \$5,000 or partly damaged, \$1,500

This assistance will be based on the actual cost of damage or the maximum grant whichever is less.

The proposed relief and rehabilitation needs in the Western, Eastern and Northern Division are highlighted below.

16.0 WESTERN DIVISION

The Commissioner Western has recommended no food relief programme for the division in light of the minimal flood impact on crops however emphasis would be placed on rural infrastructure rehabilitation involving rural roads, cane access and non-cane access roads **at an estimated cost of \$1,576,000 as shown in Table 4 above**. As highlighted above the Ministry of Transport, Works and Energy would be making a separate submission to Cabinet on the overall infrastructural rehabilitation. While some people suffered losses to household items, it is not to the extent to warrant assistance as in the case of the flooding in Labasa and surrounding areas in February, 2007.

16.0 EASTERN DIVISION

One month supply of food ration at an estimated cost of \$142,661.00 together with planting material are being sought for the ten (10) affected islands in the Lau

Group to enhance food security and self sufficiency in those islands. Refer Appendix 9 for details.

The cost of the proposed relief and rehabilitation programme for the Eastern Division is estimated at \$158,583.98 as summarized below.

No.	Type	Cost
1	Operational Cost	\$977.60
2	Administration Cost	\$12,600.00
3	Food Ration Supply	\$134,406.38
4	Vector Control Unit	\$2,600.00
5	Agriculture Rehabilitation Programme	\$8,000.00
	TOTAL	\$158,583.98

17.0 NORTHERN DIVISION

The proposed relief and rehabilitation programme for the Northern Division is as follows:

- (a) Supply of one month food ration to the affected communities in the Tikina of Namuka, Dogotuki, Udu, Tawake, Saqani, Taveuni and Rabi at an estimated cost of \$356, 435 as detailed in Appendix 10.
- (b) Provision of financial grants totaling \$142,240 to those whose houses were either completely destroyed or partly damaged by TC Cliff in line with Cabinet Decision No. 120 of 20/3/07. Refer Appendix 4 for details.
- (c) The provision of financial grants totaling \$34,500 to victims of the Qawa river flood who suffered losses to crops and household items as detailed in Appendix 11.

- (d) The provision of financial grants totaling \$4,800 to victims of TC Cliff in Taveuni as shown in Appendix 12.
- (e) Rural road rehabilitation in the Rabi, Saqani, Taveuni, Seaqaqa, Macuata and Cakaudrove districts totaling \$735,000 as summarized in Appendix 6.
- (f) A total of 17 schools, mostly primary damaged by TC Cliff are seeking financial assistance from Government totaling \$73,948 although some have been assisted by the Ministry of Education as shown in Appendix 5.
- (g) Rural water supply rehabilitation requirements in respect of six villages/settlements in Cakaudrove and Macuata at an estimated cost of \$27,081 as shown in Appendix 7.
- (h) Operational/admin costs with respect to the operation of divisional and district emergency operation centres, management of evacuation centres, damage assessment/survey undertaken by government teams and the proposed relief and rehabilitation exercise amounts to \$150,170 as detailed in Appendix 8.

The cost of relief and rehabilitation needs for the Northern Division is estimated at \$1,524,174 as shown in Table 7.

Table 7 Summary of Relief and Rehabilitation Needs – Northern Division

No.	Nature of Work	Cost
1.	Operational/admin	\$150,170
2.	One month food ration	\$356,435
3.	Housing assistance – Completely destroyed	\$90,000

	houses	
4.	Housing assistance – Partly damaged houses	\$52,240
5.	Taveuni cash grants-damaged household items	\$4,800
6.	Qawa river flooding – Cash grants for damaged crops & household items	\$34,500
7.	Rural road rehabilitation	\$735,000
8.	School rehabilitation	\$73,948
9.	Rural water supply rehabilitation	\$27,081
	TOTAL	\$1,524,174

The cost of the proposed relief and rehabilitation programme in the Northern, Western and Eastern Division is estimated to be \$4,308,991 as summarized in Table 8.

Table 8 Cost of the proposed relief & rehabilitation programme

SECTOR	NORTHERN	WESTERN	EASTERN	TOTAL (\$)
1.Social:				
(i) Housing – Cash grant	\$142,240	0	0	\$142,240
(ii) Health	0	0	\$2,600	\$2,600
(iii) Agriculture	\$356,435	0	\$142,406	\$498,841
(iv) Education	\$73,948	0	0	\$73,948
(v) Financial grant - Household items	\$4,800	\$498,234	0	\$503,034
(vi) Financial grant - Crops	\$34,500	0	0	\$34,500
Total	\$611,923	\$498,234	\$145,006	\$1,255,163
2. Infrastructure:				

(i) Roads (Rural)	\$735,000	\$665,000	0	\$1,400,000
(ii) Crossing	0	\$502,000	0	\$502,000
(iii) Transformer	0	\$50,000	0	\$50,000
(iv) Non Cane Access Road	0	\$270,000	0	\$270,000
(v) Cane Access Road	0	\$641,000	0	\$641,000
(vi) Rural Water Supply	\$27,081	0	0	\$27,081
Total	\$762,081	\$2,128,000		\$2,890,081
3. Operation/Admin:	\$150,170		\$13,577	\$163,747
GRAND TOTAL	\$1,524,174	\$2,626,234	\$158,583	\$4,308,991

18.0 LESSONS LEARNT

The following lessons were learnt from the recent flood and TC Cliff in the Northern, Western and Eastern Division (including lessons from the February 2007 flood in the Northern Division):

- Improve weather forecasting capability, in particular cyclone early warning system, in order to issue timely and adequate warning and to ensure that such warning corresponds with ground condition;
- lack of operational knowledge and skills by personnel manning the Emergency Operation Centres;
- unavailability of essential back up equipment and facilities to facilitate emergency operations, viz: generators, satellite phones and boats;
- unavailability of pre-stocked emergency items (to be placed in strategic locations) for the purpose of emergency relief;

- the need to engage trained and experienced personnel on survey/assessment and relief work;
- poor community response to flood warnings and the need to strengthen community awareness and state of preparedness;
- the need to put in place effective flood early warning system to ensure dissemination of adequate and timely warning to the community;
- promote and apply community based disaster risk assessment tools and best practices; and
- the establishment of integrated flood management system for all major catchments in the country

19.0 CONCLUSION:

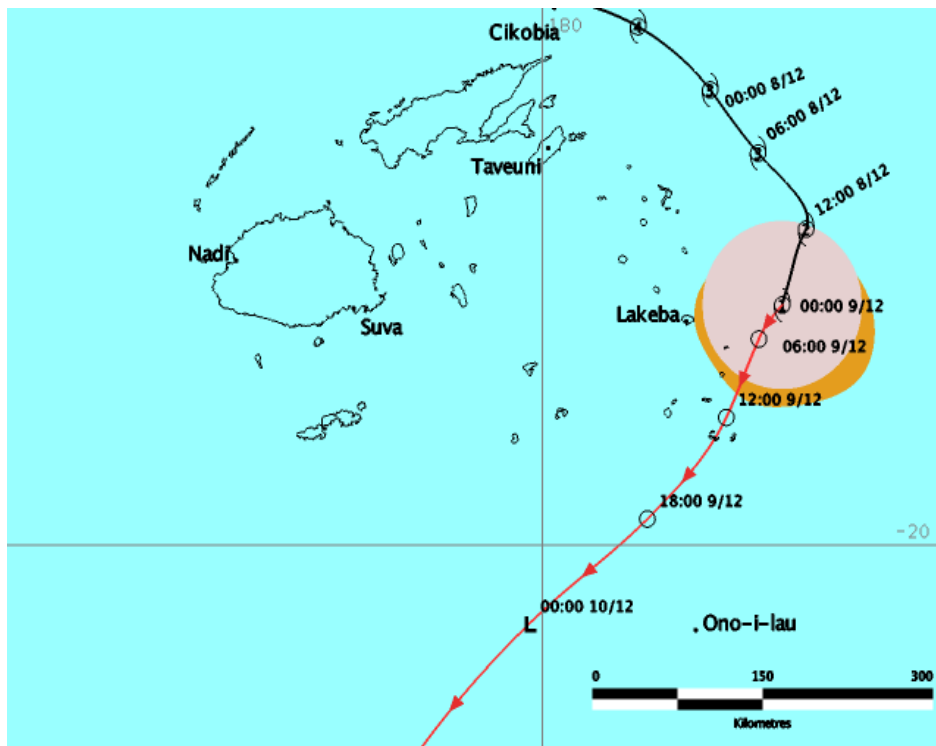
With the increase in the frequency and impacts of hydro meteorological hazards predicted by climate scientist the challenge is for the National Disaster Management Office to convince the government to support disaster management with more focus on disaster preparedness. There should be a paradigm shift in the management of disaster from the old practice of reactive to become more proactive.

It is important that decision makers in the government be informed by NDMO on ways of mitigating the impacts of disaster that can help in the reduction of cost incurred to the government. Disaster awareness program should be taken to the highest level for leaders or policy makers to be aware of the increasing trend in disaster and also its impacts to the economy.

It is time for the government to support the National Disaster Management Office by providing more funds for the development of the NDMO in terms of human resource development, training and educational awareness.

APPENDIX 1:

Tropical cyclone Cliff Operational Track produced by FMS.



Source: Fiji Meteorological Services.

APPENDIX 2:**Lists of Evacuation Centres:**

A. Event: Flood Date: February 9 – 12 Location: Nadi District

Name	No. of Families
1. Meigunyah Muslim Primary School	4
2. Nadi Sangam Primary School	2
3. Koroivolu Methodist Hall	1
4. Social Welfare Office	4

**B. Event: Flood Date: March 09 – 11 Location: Labasa District
Ra District**

Name	Men	Women	Children	Total
1. Labasa Civic Centre	10	20	15	45

Name	No. of Families
1. MH Compound	3
2. Rakiraki Muslim School	5
3. Provincial Administrator Ra's Office	6

C. Event: Flood Date: 23 March Location: Navua/Korovou, CCD

Name	No. of Evacuees
1. Tailevu North High School	145
2. Naloto Complex	20

3. Nabilo Community Hall	15
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D. Event: Flood Date: March 25 – 28 Location: Lautoka District

Name	No. of Families
1. Coronation Church Hall	8
2. Lovu Sangam Primary School	25
3. Matawalu Church Hall	25

E. Event: TC Cliff/Flood Date: April 04-06 Location: Buca, Macuata

Name	Men	Women	Children	Total
1. Kama District School, Tukavesi	5	5	14	24
2. Vunisaiki District School, Natewa	-	-	-	35

References:

1. NDMO, 2007, TC Cliff and Flood Cabinet Paper.
2. University of the South Pacific (2004) "Oceanic Waves", *START*, Volume 6 Issue 3&4.
- 3.