

OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS

TOKELAU

**TROPICAL CYCLONE
PERCY**

United Nations Disaster Assessment and Coordination Team

UNDAC

DAMAGE ASSESSMENT REPORT

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United Nations

MAP OF TOKELAU

Emergency Situation

On Friday 25th February Tropical Cyclone Percy, a category 3 to 4 cyclone with sustained winds measuring from 178 to 249 km/hr, impacted on the islands of Tokelau. The storm surge of the cyclone sent waves across the atolls and through the villages from both the ocean and the lagoon sides, clashing in the middle. The waves, accompanied by increasing winds and torrential rain, continued until the early hours of the morning of the 26th.

Reports of widespread damage were received from the two atolls of Fakaofu and Nukunonu, while communication with the atoll of Atafu remained limited for over a week.

A complicating factor of the event was that it occurred during a session of parliament at which all the village leaders from the three atolls were together in Nukunonu and were unable to immediately return home.

UNDAC Activation

On 2nd March Ms Joyce Yu, Resident Representative, Resident Coordinator UNDP Samoa formally passed on a request for an UNDAC mission to visit Tokelau and assist with damage assessments being undertaken by the Tokelauan administration.

Ms Joanne Laurence of Australia, Team Leader and Mr Tony Hill of Samoa were selected. Mr Hill was in-country in Samoa and Ms Laurence arrived on 4th March.

The team was initially to be deployed on 5th March, however delay of the boat on which they were to travel moved deployment back to 7th March.

Mission Objectives

The standard Terms of Reference for UNDAC Missions as provided by OCHA in briefing files were applied and the Government of Tokelau indicated that the main objective of the UNDAC mission was to assist them in the provision of a comprehensive assessment of damages and requirements related to TC Percy. Tokelau welcomed the assistance of an international, independent team. This was completed in close collaboration with the Tokelauan Government.

The Mission, through the posting of situation reports on the internet by the Geneva office was also to provide an important avenue for making the international community aware of the situation in this small country.

The final report submitted by the UNDAC team would also contain important information, which representing an independent assessment, under the UN banner and made up of team members from a number of countries, could be used together with Tokelauan assessments to provide information to the donor community.

Tokelauan Counterparts

Throughout the mission the UNDAC team worked closely with a number of representatives of the Government of Tokelau, particularly the General Manager, Apia Mr Falani Aukuso, Mr Zac Patelesio, Director Tokelau Transport Department and Support Services, and Mr Foua Toloa, Director of Economic Development and Environment. Mr Patelesio and Mr Toloa accompanied the team to Tokelau.

At all times the team received a great deal of support from the Tokelauan administration and preparations for the mission were thorough and completed well in advance. While in Tokelau the Council of Elders in each village and the people of the villages were extremely hospitable, generous with their time and information, and in all ways helpful in the gathering of information for the report. The team wishes to warmly thank all involved for their assistance.

Significant support was also supplied by Ms Joyce Yu, Resident Representative, Resident Coordinator UNDP Samoa and her staff.

Other Counterparts

Two representatives of the Samoan Red Cross accompanied the UNDAC team as UNDAC designated observers, and will be submitting their own analysis of needs on the atolls. The Tokelauan Government also made a request to the South Pacific Regional Environment Program (SPREP) for an expert to provide an assessment of damage to the marine environment. Ms Miriam Philip, Wetlands Management Officer, therefore joined the team once again as a designated observer and will be making her own parallel assessment in the marine sector. The combination of sectoral expertise which made up the team as a whole, proved to be an excellent combination and the team functioned well together.

Schedule

The team traveled to Tokelau on the cargo barge Samoa Express. The schedule followed by the team to Tokelau is described below:

Depart Samoa	7 th March	8pm
Arrive Fakaofu	9 th March	7am
Depart Fakaofu	9 th March	6pm
Arrive Atafu	10 th March	7am
Depart Atafu	10 th March	6pm
Arrive Nukunonu	11 th March	7 am
Depart Nukunonu	12 th March	12 pm
Arrive Samoa	13 th March	6pm

BACKGROUND INFORMATION

General Information on Tokelau

Tokelau is a Non Self-Governing Territory of New Zealand, though it is currently progressing steadily toward self-determination, under which Tokelau will manage its own government administration. It is situated about 483km north of Samoa. Atafu is the northernmost atoll, 92km north of Nukunonu, which in turn lies 64km north of Fakaofu.

Each atoll consists of a number of reef-bound islets encircling a lagoon. These vary in size from 90m to 6km in length and from a few meters to 200 meters in width. The largest is Nukunonu at 4.7km. Tokelau has a total land area of around 12 square meters. The three atolls have the following populations: Atafu 589, Fakaofu 562, and Nukunonu 458.

The culture of Tokelau is Polynesian and there are linguistic, family and cultural ties to Samoa and strong cultural links with Tuvalu. Tokelau keeps strict control of the numbers of people allowed to visit the islands every year.

The main hazards faced by the country are storm surge, tropical cyclone and tsunami, though earthquakes are also sometimes felt. The current cyclone is considered to be the worst since 1966. As the islands have no rivers etc. water sources are fragile. Water is collected in tanks within the foundations of houses, fed by collectors in the roofing gutters. The islands are very low lying, with the highest point only 5 metres above sea level. Considering that the total land mass is also very small, exposure to storm surge is extreme. Understandably there is a great deal of concern about global warming and sea level rise.

Tokelau is challenged by a shortage of natural resources. Poor soil quality and rapid drainage result in low fertility except in areas where efforts have been made to improve soil composition. The Tokelauans' lifestyle is highly dependent on the marine environment. Dietary staples include fish, coconuts, breadfruits, papaya, and taro.

Tokelau is also limited in human resources with less than one hundred able bodied men in each of the three villages. No cars are present on the islands and only one truck is available on each atoll to assist with movement of heavy items.

System of administration

The structure of the Government is as follows: The General Fono, or parliament is composed of elected members from the three atolls (8 from Fakaofu, 7 from Atafu and 6 from Nukunonu). The Council of the Ongoing Government of Tokelau, effectively the Cabinet, is composed of three Faipule (village leaders) and three Pulemuku (village mayors) - one per atoll. The position of the Head of Government, Ulu o Tokelau, rotates each year. Each member has a portfolio. The Ulu o Tokelau has responsibility for disaster management.

Supporting the Council and the General Fono is the national public service, consisting of the General Manager Apia, and Directors of Health, Education, Transport and Support Services, and Economic Development, plus a small number of departmental staff. Tokelau has recently gone through a major public sector restructure, with the size of the public service reducing to 30-35 from 130 a year ago.

On each atoll there is a General Manager as head of the public service and a Pulenuku or mayor. The atolls are strongly governed by the Taupulega or the Council of Elders. Each atoll has an office and a fale for meetings.

DAMAGE ASSESSMENT INFORMATION

The following represents an over all assessment of the damage encountered during this mission. The assessment will be presented by atoll and within common sectors. It should be noted that, due to transport and access limitations the UNDAC team did not have the opportunity to visit damaged sites until almost two weeks after the damage occurred. In the interim the people of Tokelau had already put a great deal of effort into the clean up process.

FAKAOFO

On Fakaofu the UNDAC team met with the Council of Elders and received an indication of their areas of concern. They also walked around much of the main island and the second settlement of Fenuafala and visited three outer islands which are used as plantations. During the cyclone the second settlement was cut off from the main island.

Infrastructure

The Sea Wall was highly effective and has saved much of island from further damage. Unfortunately in the process much of the sea wall has been damaged, particularly on the South South Western side. The debris from the damage of the sea wall has been washed onto the island. The Council of Elders mentioned that this would be one of the main areas in which they would look for assistance. They consider that they have the expertise on the island to construct the sea wall, but they lack the materials and machinery which would make it less labour intensive. Two types of sea wall have been used – Gabion baskets and concrete. They interact differently with the waves, the baskets absorbing the wave, and the concrete impacting against it.

On Fenuafala when the sea wall was constructed, it was not built around the whole island. A study had recommended no sea wall be built in certain positions. In the positions where it was built it made an obvious difference in the impact of the cyclone. Most of the sea wall has now been destroyed. In one place where a decision was made not to build the original sea wall, the local church built their own. While this sea wall has saved the church, most of the beach in front of the church sea wall eroded within two hours of its construction.

Apart from damage to the sea wall, on the West side of the main island one house was destroyed and several others were damaged.

The Fatupaepae house which was being used by the women's group was severely damaged. It is an elevated building and has lost its steps entirely, making it unusable. It has also suffered other damage to roofing and windows. The house is situated in an extremely vulnerable position. It may be better to put effort into the provision of an alternate site. The women's group is now forced to meet in the women's houses.

One of the bulk storage sheds has suffered significant damage. Most of the door has been swept away making it open to theft and weather damage. Some of the stores were swept out to sea. The people had erected shelves and placed the stores on them

to elevate them, but the loss of the doors and the height of the waves meant that most of the store, such as cement mix has been damaged.

Communications were unavailable for around 4 days on the atoll though the problem has not been definitively located. There is a suggestion that this was associated with the battery cover being blown off. Teletok has one satellite phone on each atoll which was used to facilitate communications on Fakaofo.

Agriculture and Livestock

Several staple crops have suffered damage:

- Damage to breadfruit crop is significant. Most of the crop is expected to die soon.
- Attempts to save the swamp taro have been made, but damage seems to be significant. The plants were all inundated by salt water, causing them to rot. The team would be surprised if much is saved. It is expected to take 18 to 24 months to establish a new crop.
- Coconut palms were also damaged, though less than other crops. This is a major staple. Some of the crop may be salvaged, but the harvest will be much reduced. Most of the young coconuts were pushed down.

Due to the position of the pigsties of the village in a very low lying area, around 50% of the pigs were lost and almost all the pigsties were destroyed. Pigs are wandering around free. This poses a significant health risk due to the spread of their faeces around the village. Rebuilding the pigsties should be a priority from a health perspective. The loss of the livestock will also further reduce the food supplies of the village.

Schools

Water passed right through the school building. School books had been removed before hand so there was little damage to that equipment. The school is situated in a particularly low lying area and consideration is being made of the need to plan new buildings on higher ground. The school buildings themselves are built low to the ground. One of the school buildings was lost entirely. Another has lost the corner of the roof and the tiles are peeling due to the inundation. This will present a future health problem.

Two of the water tanks used by the school were blown off the building and will need to be completely replaced. One of the toilet blocks was badly damaged and the school now only has access to one toilet block for 180 children.

The school has been closed due to the difficulties in children traveling in this type of weather, but is expected to open soon.

Hospital

The hospital is located at the second settlement. It houses approximately 12 beds and covers basic needs for minor surgical and medical procedures. The main illnesses usually treated are diabetes, gout, hypertension and flu. All critical cases are

transferred to Samoa. There is no capacity for screening blood for HIV, Hepatitis etc. before transfusion.

It has suffered damage to a large amount of roofing with the corrugated iron being loose. This does not seem like it would be difficult to rectify, though while it is loose it poses a significant health risk in the event of another cyclone.

The supply of drinking water for the hospital has been contaminated by salt water. At the present the hospital must fill bottles from nearby houses and bring it to the hospital.

The hospital septic tank overflowed due to the water level. This poses a health risk to the area. The staff consider that there may have been some permanent damage done as there is a smell when toilets are used.

The doctor's house sustained some damage, as did nurses' quarters. Nurses are currently housed elsewhere.

The water pump is not working. It has perhaps been damaged by the salt spray.

The bicycle used for family visits has been swept away.

Some medical equipment was damaged by the salt spray. It is likely to corrode. A list has been provided by the nurse to the Council of Elders.

The hospital does not have a backup generator and when the power was turned off was left without any power at all.

Water and Sanitation

Water catchment systems which funnel rain from the roof of houses to the water tanks in the foundations have been contaminated with debris and salt water. This is not considered to be a major risk at present.

Waste management has been an issue for some time. They are attempting to recycle items. During the cyclone some of this waste has been spread about the island and into the ocean. In the past much of the rubbish on the island was biodegradable, but now with the increasing use of modern materials this is no longer the case.

Environment

The atoll has already experienced incidences of fish poisoning, due to metallic wastes in the lagoon. The people feel this is related to the wreck of a fishing vessel which remains on the beach of one island. The vessel has been there for some time, but has moved during the cyclone and people feel this may exacerbate the problem. The atoll has experienced an increase in ciguatera poisoning after previous cyclones and so are expecting this to occur again.

Erosion has occurred due to the cyclone, though it has been an ongoing problem. Some small islands have disappeared entirely. Erosion has been extensive on

Fenuafala, particularly near the school. On the main island a great deal of the land on which the pigsties were positioned has been lost, leaving the area extremely low and open to the tide. Along the coast over seven meters of sea wall was lost.

Many of the large trees around the island have suffered damage from the water and the salt spray. Some of these may fall. The trees are quite solid and are interspersed regularly between houses. They should be examined to determine which represent a risk.

It has been noted that there has been a rise in the number of mosquitoes, probably associated with the increase in pools of stagnant water suitable for breeding. The community has experienced outbreaks of dengue fever in the past in the wake of a cyclone.

Disaster management arrangements

The first indication on the island that the cyclone was coming their way was a call from New Zealand to the Council of Elders approximately 24 hours before it arrived. A system is in place under which information is to be downloaded from the Fiji Meteorological Service by a designate on Atafu and then relayed to the FM radio station. This system did not seem to work effectively. Many people were receiving information on the cyclone by listening to the Samoan Broadcasting Corporation.

Fakaofu does have a disaster management plan, however the key players in the plan were all away at the General Fono held on Nukunonu at the time of the cyclone. The plan includes colour phases for timing the impact of the cyclone, main contact people and safe havens. This is an excellent beginning, but as yet there is not wide understanding of the plan by the community. It will be necessary to achieve broader understanding of the plan before it can be effective during a disaster.

Power on the atoll is provided by diesel generators. A shortage of diesel fuel meant that it was not possible to provide someone to monitor the cyclone 24 hours.

Comments

It should also be noted that the Council of Elders is worried that they have limited manpower to devote to carrying out rehabilitation activities. They requested the provision of machinery to speed up the work and to assist with the clean up process.

They also feel that they are experiencing sea level rise due to climate change. They have noted that the area in which they have kept their pigs for many years is now threatened with inundation. They noted their disappointment that certain countries have not signed the climate change convention.

NUKUNONU

On Nukunonu the UNDAC team met with the Council of Elders and received an indication of their areas of concern. They also walked around much of the main island and skirted much of the atoll chain by boat, landing on one of the outer islands. It was evident that Nukunonu had suffered the most damage of the three atolls. Reports indicate that 80% of the village was under seawater at some time.

Infrastructure

Approximately 80% of the buildings in the village are reported to have sustained some damage and at least five homes were severely damaged. A number of houses have suffered extensive erosion around their foundations. They are already showing cracks as a result and require treatment.

The Sea Wall was highly effective and has saved much of island from further damage. Unfortunately in the process much of the sea wall has been damaged. The debris from the damage of the sea wall has been washed onto the island. The Council of Elders mentioned that this would be one of the main areas in which they would look for assistance. They consider that they have the expertise on the island to construct the sea wall, but they lack the tools, the materials and machinery which may make it less labour intensive. They noted that there were not enough able bodied men for a speedy reconstruction of the sea wall. They also feel they do not have enough boats to move the required materials to rebuild the sea wall. They were concerned that the sea wall be reconstructed before the next cyclone season.

Two types of sea wall have been used – Gabion baskets and concrete. They interact differently with the waves, the baskets absorbing the wave, and the concrete impacting against it. The Council of Elders also mentioned that there were problems with both of these methods of construction and sought advice as to whether there might be another method which was more appropriate.

They are also concerned that the current sea wall has really only lasted ten years. If it is reconstructed, will it need to be done again in another ten years? They mentioned that the company that constructed the wall guaranteed it for 50 years. Perhaps this should be followed up.

They also requested gloves and shoes for protection during the clean up.

Phone lines were not lost on Nukunonu and communication with New Zealand and Samoa was maintained. Some cables were broken, but power was restored as a priority. Great assistance in monitoring the cyclone was provided by the Samoan Broadcasting Corporation (SBC), which provided regular updates. The SBC even added a 24 hour service over the night of the cyclone to continue providing updates. Unfortunately power was lost during the night, which meant that people in the villages were not able to keep accessing this information. Consideration in future should be given to providing some back up service which would allow the villages to continue monitoring.

The approach to the bridge at Nukunonu village was washed away and this isolated part of the village (Motuhaga), including the hospital. Fortunately medical staff and supplies had already been positioned in other places on the island. Priority was given to restoring the bridge and clearing the main road in the clean up process and the area is now accessible.

Agriculture and Livestock

Several staple crops have suffered damage:

- Attempts to save the swamp taro have been made, but damage seems to be significant. The plants were all inundated by salt water, causing them to rot. The team would be surprised if much is saved. It is expected to take 18 to 24 months to establish a new crop.
- Coconut palms were also damaged, with immature nuts and flowers falling from the trees. This is a major staple. Some of the crop may be salvaged, but the harvest will be much reduced. It will take years until the previous level is regained. The Council feel they will only have enough to last them for a few months. They fear famine and thirst, as the coconuts are a major drinking source.
- Banana and breadfruit crops were severely damaged and it is expected that little can be saved.

The Council of Elders said that they would also benefit from information on how long it will take for the fruit which has been affected to be rehabilitated and assistance in this process.

Many of the pigsties on the island were destroyed and pigs are wandering around free. This poses a significant health risk due to the spread of their faeces around the village. Rebuilding the pigsties should be a priority.

Schools

Matiti School is situated in a very low position on the island, and the building itself is quite low to the ground. It normally accommodates around 140 students from infants to year 11. It has 18 staff. Waves came through the school both from the lagoon and the ocean side and clashed in the middle on the school grounds. Considerable water damage was experienced. Extensive erosion of the beach near by occurred. Trees were uprooted and some nearby families were evacuated.

40% of the books in the school were damaged. Many were washed out to sea. The Principal has tried to salvage what is possible, but attempts to dry out books are likely to have only marginal success. Shelving in the school was waterlogged and is likely to rot. The metal legs of the chairs in the school rooms have been exposed to salt water and will corrode in time. Other teaching materials such as board games, teaching aids and stationery were also largely damaged or swept away.

A great deal of dirt and debris were deposited in the school and will require water blasting and disinfecting to clean effectively. Until this is accomplished the area is a health risk. A considerable amount of rubbish also remains in the school grounds.

Material which was originally eroded away from the beach came back into the school several days later as sludge.

Large holes were punched in two school room doors by a floating log, which further allowed the water to stream into classrooms. Some walls have been damaged. Many of the louver windows were broken. Anything that was on the floor was damaged. Though a great deal of clean up has been done and some repairs have commenced there is still a great deal to do before the school will be able to open again.

The 5-6 computers that the school had were affected by the salt spray and the principal cannot use them to access any outside information. The photocopier, fax machine and printer have also been damaged beyond repair.

The toilet block over the lagoon has been destroyed, so there are no toilet facilities for the boys. This represents a major obstacle to the reopening of the school.

The school is built in a very vulnerable position and could easily be cut off. Ideally it should be sited elsewhere, but if this is impracticable some type of protection must be developed.

The Principal Mr Hefo Vulu has submitted a plan for reconstruction and improvement to the Council of Elders.

Hospital

The hospital houses approximately 12 beds and covers basic needs for minor surgical and medical procedures. It has four registered nurses and two nurses aids. There is X-ray equipment available, but it has been in need of repair for some time. The main illnesses usually treated are diabetes, gout, hypertension and flu. All critical cases are transferred to Sam oa. There is no capacity for screening blood for HIV, Hepatitis etc. before transfusion.

During the cyclone all power to the hospital was lost. The stand by generator that they had became wet and did not function. The water pump was also wet and did not function, though fortunately a spare was available.

The Doctor's house at the hospital has experienced very extensive damage. Part of the wall has been pushed through, water has flooded through the whole building, all of the flooring has been destroyed. A great deal of dirt and debris remains. It is completely unusable and would require replacement.

In preparation for the cyclone the hospital split its medical personnel into three groups and placed them with appropriate supplies at different parts of the atoll, in case access should be cut off, which did indeed occur. This was an excellent example of effective preparedness.

Medical supplies in the hospital were elevated to prevent water damage, though some still suffered from the salt spray. The stretcher in particular was wet and is likely to rot.

Only one major injury was treated by the hospital as a result of the cyclone, though many small abrasions etc. were treated.

Water and Sanitation

Large amounts of debris are still present across the island. Apart from the time and manpower required to complete the clean up process there is a significant problem in where to put the debris. Currently there are many nails, pieces of broken glass and rusty metal strewn about the island amongst the debris which pose a significant health risk to anyone simply walking around the island. In the event of a further cyclone or storm these would be very dangerous.

In the past much of the rubbish on the island was biodegradable, but now with the increasing use of modern materials this is no longer the case. No suitable method storing or disposing of rubbish for the long term has been developed. This will be an ongoing problem both for the health of the residents on the island and for the marine environment as much of it inevitably ends up in the sea.

The Council of Elders noted that they had abandoned their traditional toilets, which are out over the lagoon, in favour of septic tanks. There now seemed though to be a problem in a cyclone of these septic tanks overflowing and creating a health hazard. They requested advice on how to deal with this issue.

Environment

The Council of Elders noted that fishermen had gone out and inspected the marine environment. They noted that many of the holes in the coral where the fish normally lived were now filled with sand and debris. They expressed concern that there was no suitable habitat available now for the fish to live in. Much of the coral had been smashed also and was covered in rubble, debris and rubbish.

Scouring of both the lagoon and ocean side of the island has occurred. Many of the outer islands suffered severe erosion and some small islands were washed away completely. Several of the houses in the village have experienced major erosion around their foundations, with gaping holes beneath the sides of the buildings. Cracking can already be seen on the buildings themselves. Erosion has occurred to the main road and as mentioned occurred on either side of the bridge. In the cemetery much of the sand around the graves was washed away. This is not only a hazard but would be extremely distressing to the people of the island. Erosion also exposed underground cabling.

It was noted that the number of insects on the island seemed to have increased and there was a problem with red ants.

Disaster management arrangements

Though the school does not at present have an emergency plan the Principal indicated his interest in developing one.

No system of warning is currently in use in Nukunonu, such as horns etc.

Comments

Some preparations were made during the time when it was thought that Tropical Cyclone Olaf was going to impact on Tokelau. These were of benefit in the preparations for Percy. However the people of Nukunonu felt that they had not had sufficient warning to prepare themselves fully for this cyclone – less than 24 hours. This preparation was made more difficult by the fact that the General Fono was being held in Nukunonu at the time. This necessitated accommodating and looking after around 120 additional people. It also meant that the people of Nukunonu were already tired from their preparations for the General Fono when they then had to prepare for the cyclone.

They had not thought that TC Percy would be as strong as it was. They stopped the General Fono around 3.00 and had until 10 pm to make their preparations, though much of this was in the dark, as power was out and there was no moon. Winds were already strong in advance of the cyclone.

The Council of Elders noted their need for additional able bodied men to assist with the clean up and reconstruction.

The Council wished that it be noted that they were concerned about sea level rise and the impact of Global Warming. They are certain that changes have occurred in Tokelau and emphasise this as an issue of great importance to them.

The Council also wanted it noted that this is the first time in the history of disasters on Tokelau that this level of assistance and attention from the international community has been received. It is considered most welcome.

Morale seems to be quite low, especially in comparison with the other atolls.

ATAFU

On Atafu the UNDAC team met with the Council of Elders and received an indication of their areas of concern. They also walked around much of the main island and visited two outer islands which are used as plantations.

Infrastructure

In Atafu damage had already occurred to the Sea Wall in December-January. With Cyclone Percy this has now become extensive. The Council of Elders believes that if it had not been for the sea wall that much of the village would have disappeared. They recall that before the sea wall was built the island had been washed over from one side to the other during a cyclone. Houses on the shore suffered significant damage. There is a great difference in the damage to the village now. The sea wall is a high priority for them and they have requested the use of a loader to assist with its repair.

At a certain point on the shore a channel was created through which boats from the island could access the open water. This channel has been getting shallow and is considered to have had a great deal of sand dumped in it from the cyclone. The channel was constructed by the New Zealand Government around ten years ago and been of great assistance. Unfortunately it has not received any maintenance during this time.

Atafu is fortunate to have an excellent safe haven for its boats. Most of the atolls boats were moved to this safe haven before the impact of the cyclone and as a result most of them were saved.

During the cyclone the telecommunications system went down entirely and it was almost two weeks before it was restored. For some time Atafu was completely cut off from external communications. The UHS pillar which was to be used to relay meteorological information to the other islands has been damaged. Power was down for some time. Some transformers were wet, while others were destroyed by the waves. Some cables were wet and others were broken.

Around half of the stock in the bulk supply storage shed was washed away. Some of it also had to be written off as it was no longer suitable for long term storage. The goods which were to be written off were distributed to families for immediate use. The door to the storage space is gone, leaving it open to thieves or weather damage. Shelves were erected within the storage space to attempt to save the goods from the water, but much of the goods were exposed due to the high water level and spray. Of the three bulk storage sheds all were damaged to some extent. The second was suffering damage anyway due to age, the third had water and debris pass through it.

Agriculture and Livestock

Several staple crops have suffered damage:

- Attempts to save the swamp taro have been made, but damage seems to be significant. The plants were all inundated by salt water, causing them to rot.

The team would be surprised if much is saved. It is expected to take 18 to 24 months to establish a new crop.

- Coconut palms were also damaged, with immature nuts and flowers falling from the trees. This is a major staple. Some of the crop may be salvaged, but the harvest will be much reduced. It will take years until the previous level is regained.
- Banana and breadfruit crops were severely damaged and it is expected that little can be saved.
- The Pandanus crop sustained some damage but seemed hardier than the other crops.

Schools

The school is positioned on a place of high ground and was used as a meeting house and evacuation point. The roof has suffered some damage though and is leaking.

Hospital

The Lomaloma hospital houses approximately 12 beds and covers basic needs for minor surgical and medical procedures. The main illnesses usually treated are diabetes, gout, hypertension and flu. All critical cases are transferred to Samoa. There is no capacity for screening blood for HIV, Hepatitis etc. before transfusion.

During the cyclone the hospital septic tanks overflowed, presenting a significant health risk. A number of items of medical equipment were also affected by salt spray which will mean that they will in time rust and be unusable.

The hospital was challenged during the cyclone once main power was turned off for the storm as they have only a small generator available. This is enough to power lights, but not to sterilise or autoclave instruments.

The computer used by the hospital to store medical records was damaged during the cyclone.

The cyclone caused the hospital to be flooded and a great deal of debris was left behind. The people of Atafu made the hospital their first priority in their clean up of the island.

Water and Sanitation

Debris, large rocks from the destruction of the sea wall and broken bottles were strewn across the island during the cyclone. Much of this has now been cleaned away.

The Council of Elders noted that they were concerned about the ongoing problem with waste management on the island and its impact on the environment. They requested that a portion of the report be devoted to the question of waste management and would like to request assistance in devising a method of disposing of the rubbish in future. This is a significant issue on the atolls as there is little facility for the storage or recycling of garbage. During the cyclone three quarters of the rubbish on

the island is thought to have gone into the ocean. The Council are particularly concerned about damage to the marine environment and consequent fish poisoning occurring.

Several cases of diarrhoea were treated by the hospital. It is felt that these were associated with the overflow of the septic tanks.

Environment

Significant erosion has occurred to the coast line around the island. Several meters from shore to sea were lost and this continued for many meters along the edge of the beach. This is of great importance on an island of this size.

Some of the oil drums in the store appear to be leaking.

Waste management is an issue on island as it was on the others. They are attempting to recycle items and were using a compactor for aluminium cans. Unfortunately the compactor is no longer working. During the cyclone waste was spread about the island and into the ocean, creating both a health hazard and a hazard to the marine environment.

It was noted that the number of insects on the island seemed to have increased.

Disaster management arrangements

All the families on the ocean side of the village and on the north-western side of the island were evacuated to the school buildings.

Like Fakaofu, Atafu has an emergency plan, but the plan was not enacted as key people were away from the island at the time of the cyclone. Once again, for the plan to be useful, it needs to have wide understanding and involvement from the community.

Atafu has a series of horns that are used for alerting the village to a disaster. Different calls are available to alert for different hazards, though most commonly the horn is used to call the men in to the alert.

Comments

The Council of Elders also wished it noted that they are concerned about sea level rise and its impact on Tokelau. They feel they already have evidence of coastal erosion. They are also concerned about a link with the number of cyclones we are currently experiencing. Parts of the sea wall are now under water. The area in which they used to grow certain taro crops is now inundated by salt water. They associate this with sea level rise.

A significant difficulty which exists in the reconstruction process is that the atoll does not possess enough basic materials to complete the rebuilding process.

RECOMMENDATIONS

Though there are many specific issues which will need to be addressed in assisting with the long term rehabilitation of these communities, the following gives some over all recommendations within sectoral areas.

Debris

Clean up of debris is the first priority in order to return to a feeling of normalcy and to reduce the likelihood of health risks, both from injuries and to reduce the likelihood of outbreaks of dengue fever. Much work has already been done in this area. On Fakaofu and Atafu this seems to have been largely achieved, though assistance in waste management and the removal of debris would still be beneficial. On Nukunonu there is still a great deal to be done in the clean up process and the community could perhaps benefit from some assistance, not only in waste and debris removal, but in manpower to achieve this task.

Waste Management and Fuel Storage

The Council of Elders noted that they were concerned about the ongoing problem with waste management on the island and its impact on the environment. They requested that a portion of the report be devoted to the question of waste management. This is a significant issue on the atolls as there is little facility for the storage or recycling of garbage. During the cyclone three quarters of the rubbish on the island is thought to have gone into the ocean. The Council are particularly concerned about damage to the marine environment and consequent fish poisoning occurring.

Waste management is a significant challenge for the atolls. This was a problem before the cyclone, but the cyclone's impact has made it even more serious and more obvious. The Councils of Elders have noted this, are concerned about the impact on their environment and have requested assistance in devising a method of disposing of the rubbish in future. Previous to the cyclone there was an accumulation of rubbish on the islands with no real method of recycling or way to dispose of it properly for the long term. Much of this rubbish has now been washed into the ocean or is spread around the island, posing a problem both to health on islands and to the marine environment. Awareness within the community is high at the moment and this would be an ideal time to set in place a new community awareness program to develop effective attitudes to waste management and a methodical system of disposal.

Fuel storage is also an issue. The team noted several positions where drums were leaking and generally current methods are not suitable for the task. Fuel should be stored in bunkers, with walls right around and a roof over the top.

Agriculture

Secondly it seems clear that assistance will be needed with food supplies. Relief stores which have recently been delivered seem to be sufficient for immediate needs and care needs to be taken not to create a culture of dependency.

However as it will take some time for crops of staples such as taro, coconuts, breadfruit, bananas and pawpaws to be replenished, and the food supplies on the atolls will need to be monitored in the medium term. One potential area of assistance may be in the replenishment of seed stocks for items which have been destroyed.

The loss of 50% of the pigs will be sorely felt by the people of Fakaofu and will further impact on their food supplies and the balance of their diet, particularly in combination with the likely loss of fish from the area.

Sea Walls

The number one priority to the people of the atolls is the reconstruction of the existing sea wall and the continuation of the project to bring a new wall to many areas which are vulnerable. They are unanimous in their claim that the sea wall has significantly reduced the damage to the villages. It is also clear by looking at them their effectiveness has been seriously reduced by the damage that they suffered in the cyclone and for them to be effective again in future they will need to be repaired.

The people of Tokelau feel that they can direct the process of their reconstruction but they will need assistance in terms of man power, machinery and materials for their rebuilding.

This is not an issue which should be undertaken lightly though as the building of sea walls can cause extensive erosion of the surrounding beaches. Advice should be sought on the siting of the walls, on the possibilities of the use of alternate materials which may last longer and on the impact on the marine environment.

Environment

The cyclone has had a severe impact on the environment. Most of the plants have been damaged by either salt water or salt spray. Beaches have suffered major erosion and the marine environment has suffered from both the dumping of sand and debris over corals and fish habitats and the massive movement of rubbish into the lagoon. This cannot but have an impact on the fish stocks in the area. The concern about ciguatera poisoning is also an issue.

It will take some time for the plants to recover, as discussed above, but they will recover in time. The erosion of the islands is a matter of great concern though and needs to be considered carefully in association with the construction of the sea wall, both in terms of the wall's capacity to protect from erosion and if incorrectly positioned, to cause erosion itself.

The fact that all three Councils of Elders in the villages requested that the team note in this report their concern about global warming and their absolute conviction that sea level rise has already affected their islands shows how deeply this issue is felt by the people.

Damage to the marine environment is also an area which will clearly have an impact on the lifestyle and long term recovery of the islands, but the UNDAC team would prefer to leave detailed comment on this area to be covered by the report by Ms

Miriam Philip, Wetlands Management Officer, South Pacific Regional Environment Programme, who accompanied the team as an UNDAC Observer.

Buildings and Construction

Though there have been various incidences of damage to homes, over all the houses have fared quite well with the cyclone. Roofs were not lost and there is little evidence of outright collapse. Erosion around foundations is an important issue though and points to the need to examine building methods and the need for establishing a building code. If a code is enforced though, it is important that it not simply be adopted from a larger country like New Zealand, but be developed to suit the lifestyle and practicalities of the island.

There are a number of projects around the Pacific which work on developing and building 'cyclone proof' buildings. Though Tokelau's buildings fared quite well in the cyclone, as this is the main hazard to which Tokelau is vulnerable, perhaps it would be useful to examine these building methods.

Health

Though Tokelau was fortunate in not experiencing many direct injuries from the cyclone, a number of health issues present themselves.

- The increase in mosquitoes could well lead to an outbreak of dengue fever, which is a highly debilitating and dangerous disease.
- The overflow of the septic tanks in a number of areas, particularly at the hospitals is of serious concern and as water has swept through these areas and into schools and houses, cleaning with antiseptics should be considered.
- The hospitals in Tokelau are already operating at a very basic level. The further erosion of their resources through loss of computers, medical equipment and supplies will reduce their capabilities to a low level.
- The lack of screening of blood presents a serious issue should another disaster occur cutting the islands off from outside assistance. It is exactly in a disaster that it is likely to be necessary to carry out a transfusion. A program through which everyone is made aware of their blood group, so that this is known should an emergency occur would also be of benefit.
- The lack of generators of sufficient size for the hospitals also means that they may be unable to function effectively during a disaster, exactly when they are likely to be most crucial.

Education

A priority for schools will be clean up and sterilization of affected areas. Replacement of toilet facilities in schools which have lost them is essential as quickly as possible and schools should not be opened until a suitable ratio of child to toilets is available.

Psychological health and Loss of Personal Effects

Though the Tokelauans have shown a great deal of self motivation and strength in their clean up of the islands, this cyclone has had a strong impact on the psychological

health of the communities. Not only have public buildings and houses been damaged, many personal belongings were washed away or damaged and this will affect people's lifestyles both materially and psychologically.

On Nukunonu where the damage was most significant morale is clearly low, though the community is working hard to recover. On all the islands the cyclone seems to have brought a great sense of how vulnerable they are which will last long beyond the repair of buildings and plantations.

Lessons Learnt

Though many difficulties and hardships are associated with a disaster, there can be benefit in the lessons that are learnt for the future. Clearly the **Sea Wall** has proven its effectiveness in protecting the villages, though there are questions which need to be answered about the construction of them in terms of positioning and materials.

While a number of **preparedness** activities were undertaken by the people these seem to have been somewhat ad hoc and could be formulated into an emergency plan for each village, as is mentioned in the National Emergency Plan.

Designation of **Safe Sites**, has occurred in some instances, such as the Safe area of Fakaofu and the boats Safe Haven on Atafu. The designation of Safe areas, particularly for evacuation should be carried out on all islands and a campaign conducted to make sure they are known to everyone.

The **splitting up of the Medical Personnel** in Nukunonu so that should they be cut off, there would be a medical presence and supplies on different parts of the island prior to the impact of the cyclone is an excellent practice and should be encouraged not only on other islands, but in communities outside Tokelau.

Though a **communications** system was established for the islands to receive information from the Fiji Meteorological Service, it did not work in practice. The first notification of the impending cyclone came in a telephone call from New Zealand. This needs to be examined and a better system for allowing the communities on each atoll to have access to warnings 24 hours a day prior to and during the cyclone is a priority.

For note

The Government of Tokelau would also like it noted their appreciation for the prompt response to the cyclone from the international community, particularly New Zealand, Australia, the United Nations, Red Cross and SPREP. This is felt not just at Government level, but is also appreciated by the people of the community. The community also noted that this was the first time that an international assessment team had come to Tokelau in the wake of a disaster, and they were heartened by the idea that others outside Tokelau were concerned for their welfare.

Finally a point to note concerning the implementation of this mission is that the combination of UNDAC, Red Cross and SPREP into one team worked extremely

well. It provided the team with access to a range of sectoral perspectives and opportunities to share information regularly throughout the mission.