REPORT OF THE EASTERN CARIBBEAN DONOR GROUP FOR DISASTER MANAGEMENT RAPID NEEDS ASSESSMENT TEAM TO SAINT LUCIA FOLLOWING THE IMPACT OF HURRICANE TOMAS

7th November 2010

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1.0 OVERVIEW OF THE SITUATION

Hurricane Tomas, a Category 1 hurricane, affected Saint Lucia on Saturday October 30, 2010 with maximum sustained winds of 90 - 95 miles per hour with higher gusts. Excessive rainfall (533mm in 24 hrs) and high winds have resulted in significant damage to the agriculture sector, road infrastructure, and the utilities sector which caused the Government of Saint Lucia to issue a declaration of a disaster on Sunday, October 31, 2010. The most severe damage was experienced in the western [Soufriere and environs] and central [Barre De L'Isle, Bexon, Guesneau-Forestiere (the latter based on information received from NEMO)] segments of the island while the most significant utility loss is in the water sector.

Seven (7) persons are confirmed dead as a result of Hurricane Tomas. The numbers of injured and displaced persons are unknown. Presently there are 357 persons in six (6) shelters in Fond St. Jacques, Soufriere. These are the only shelters which remain active. Red Cross is planning to provide Non Food Items to 250 families nation-wide.

Across Saint Lucia the most immediate need is for safe water, for drinking and also for personal hygiene and household use. The entire population, 181,000, is impacted by disruption of the water supply - many are without drinking water or relying on bottled or trucked water. Extensive repairs are required to the distribution system, delivery of drinking water and environmental monitoring. Safe water will reduce immediate health risks and is vital for the restoration of other services (e.g. education).

Figure 1: Landslide impacting the road infrastructure

Repairs to the extensive damage to the road network and bridges are underway. However, debris collected at bridges must be removed and embankments strengthened to reduce a high risk of further potentially catastrophic, flooding. In the agriculture sector, early clearance of fields will allow re-planting of crops. Detailed risk assessments and a strategy are needed to stabilize weakened slopes and avoid further landslides.

Organised support is required for those most immediately affected; those displaced and who have lost possessions. External assistance has been coming in but further assistance is needed. This includes food and Non Food Items (NFI) as well as machinery for debris removal from homes, health facilities and schools.

Relief and damage assessment is still ongoing but would benefit from strengthened operational co-ordination at the national and district levels.

2.0 METHODOLOGY AND SCOPE OF THE REPORT

The team was comprised of ten (10) members from organisations represented on the Eastern Caribbean Donor Group for Disaster Management (ECDGDM) and two professionals from Saint Lucia. The team was led by CDEMA and was tasked with producing a Rapid Needs Assessment report within 72 hours of arrival in country. The team members were:

- Earl Arthurs – CDEMA (Team Leader)
- Ian King – UNDP
- Roger Bellers – DFID
- Max Bonnel – OCHA
- Nicole Wynter – PAHO
- Sarah Lionel – CDEMA
- Adrianus Vlugman – PAHO
- David Farrell – CIMH/CCRIF
- Emmerson Beckles – FAO
- Egbert Louis – Engineer, Saint Lucia
- Gemma Chery – Doctor, Saint Lucia
- Stein Mathison - CIDA

This report was informed by:

- Field visits by sectoral RNAT teams to Soufriere town and environs (including Fond St. Jacques), Canaries, Micoud, Anse La Raye, Bouton, Dennery, Vieux Fort and Roseau Valley.
- Sectoral meetings with agencies from Saint Lucia at National and local level; Ministry of Health, WASCO, Ministry of Agriculture, Hydrology Department, NEMO.
- Briefing from International responders; IFRC, USAID, Royal Navy
- Situation reports and data produced by NEMO.

The assessment process was in support of, and directed by, NEMO.

This assessment is based on observation, discussion and raw data provided by NEMO. Quantifications and explanations were sought of scale and type of damage and needs. Findings were cross checked within the team and with the National Disaster Co-ordinator.

This is a rapid needs assessment limited by the availability of information. More detail will be made available in a matter of days by the sectoral damage and needs assessments already underway. In light of the extensive long term impact, NEMO will request a Socio Economic Impact Assessment from UNECLAC. Particular attention will need to be paid to the livelihood impacts and coping strategies of the most vulnerable.

3.0 FINDINGS AND RECOMMENDATIONS

3.1 WASH and Health

Initial reports indicate seven (7) confirmed fatalities in Saint Lucia and at least another five persons missing and feared dead. Precise numbers of injured is unavailable due to communication challenges (internet, phone) and transportation difficulties.

The sustainable provision of safe water and sanitation remain a key concern on the island particularly to the continued functioning of health facilities, provision of shelter and wider community.

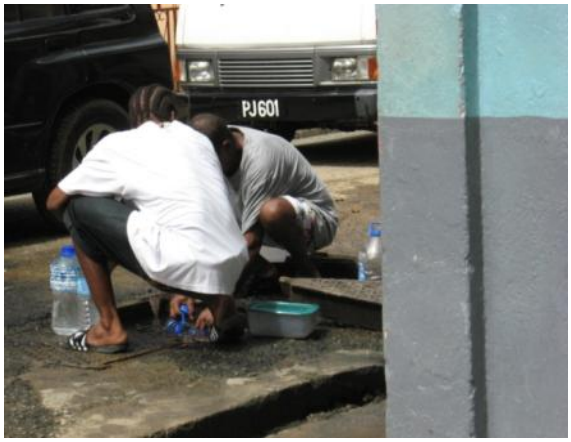

Figure 2: Collecting water in Soufriere

Most of the eight health facilities which were affected have been restored. The Dennery Hospital has however been decommissioned due to the damages. Soufriere hospital is still limited to pedestrian access, with the destruction of the main road entrance, and the Pediatric wing at Victoria Hospital needs to be re-roofed.

The general consensus is that there will be significant water shortages in Saint Lucia due to damage to the water delivery infrastructure and the electricity infrastructure. There are 28 water production facilities in Saint Lucia, and up to 6:00p.m. on 03 November 2010, only one was operational. The country's water supply capacity has decreased from 17 million gallons per day (MGD) to 0.14 MGD following the impact of Tomas; this is expected to increase to 2 MGD by November 5, 2010. Safe water will reduce immediate health risks and is vital for the restoration of health services. A large proportion of the population remains without safe water access, and no health facility (including MoH HQ) presently has piped water from the public supply. Of the 36 health facilities, only Richfond and La Resource Health Centers have rainwater catchment tanks. Both are presently at one third of their 3000 L capacity. The Victoria Hospital as of 03 November had only one week's water supply remaining in storage tank.

One observation is that the heavy reliance of Castries on the John Compton Dam introduces a significant amount of risk into the water supply system as a failure of the dam or the related delivery system leads to significant water shortages in Castries.

A few septic tanks have been washed away, primarily in Soufriere resulting in effluent discharge to drains and sub-surface areas. River water is being used for personal hygiene; clean up, to freshen toilets, etc. Within these areas there are also piles of solid waste along roads and pavements.

Needs

Needs relate to three main areas (see detailed report attached):

1. Provision of safe water to ensure continuity of health delivery services

2. Prevention of outbreaks of water/food, vector borne and skin illness and disease.
3. Re-establishing critical services offered by the now decommissioned Dennery hospital

Immediate

1. Provision of safe water to ensure continuity of health delivery services
    - Rehabilitation of water intakes, distribution mains and water treatment plants, pumping stations (also applies to #2);
    - 34 water tanks and fittings for setting up rainwater harvesting system in all health facilities;
    - Water disinfectants
    - Cleaning Materials, Hand sanitizers
    - Emergency mobile water treatment facilities (tbc)

Figure 3: Evidence of roof damage at Soufriere Hospital

2. Prevention of outbreaks of water/food, vector borne and skin illness and disease.
    - Provision of domestic water disinfectants tablets (flocculant-disinfectant type e.g. PuR or Chlor-floc, to be able to treat the turbid water) – 2 million for first 2weeks, following initial pilot to assess acceptance and use by populace.
    - 30 water testing kits/reagents for water quality surveillance
    - Provision of water containers
    - Clearing debris and solid waste, especially in affected communities in the South
    - 16 Ventilated Improved Pit Latrines for shelters in Fond St. Jacques
    - Hygiene promotion in shelters (educational materials, cleaning materials)
    - Vector control (rodents, mosquitoes) equipment and supplies (foggers, chemicals, traps, etc.)
    - Enhanced disease surveillance (communication, transportation)
    - Public information, education, dissemination; water safety, hygiene and sanitation, food safety, vector control.....
3. Re-establishing critical services offered by the now decommissioned Dennery hospital.
    - Includes upgrading Richfond health center to offer emergency care. Required supplies/equipment attached.
4. Other Facilities:
    - Re-roofing of Pediatric ward at Victoria Hospital

Early recovery and rehabilitation

1. Rehabilitation of water supply system
2. Restore functionality of Dennery Hospital
3. Rehabilitate road access to Soufriere hospital
4. Generators for health facilities
5. Equipment and contents lost and Victoria Hospital's Pediatric and X-ray units

3.2 Agriculture Sector

The agricultural sector sustained substantial damage during the passage of Hurricane Tomas with the banana industry being severely affected through toppling, flooding and sedimentation. Preliminary estimates of damage to the banana industry range between 80% and 90% with a potential weekly income loss up to EC$2.0 million over the next six month period. The need for replanting, drainage of fields and the reconstruction of irrigation systems and boxing sheds are evident.

For the non-banana sub-sectors, the impacts, while generally significant, were varied. Ministry of Agriculture reports an estimated 80 acres under open-field vegetable production were all washed away while up to 60% of greenhouses under production could have sustained major damages. Final figures will informed by further assessments. While most fruit trees remained intact, fruit loss from producing trees (citrus, breadfruit, pawpaw) was in the range of 60%. The livestock sector experienced damages through the drowning of animals, the destruction of housing for poultry and pigs and the loss of broilers and layers. Damages to the fishing industry estimated at EC$1.5 million, were realized in terms of submerged engines, loss of fish pots, gear and nets, flooding of fresh water ponds, loss of sea moss ventures and damages to aqua-culture facilities at Union and View Fort. The forested areas in the country do not appear to have sustained major wind damage although the numerous land-slides and the exposure of soils of the slopes would be areas of concern. Generally the infrastructure within the agricultural sector sustained major damages, in particular, the irrigation systems within the banana and non-banana regions, farm roads and drainage systems, soil loss due to erosion and flooding, loss of farms due to river action and as a result of land-slides within agricultural areas.

Needs

1. Cleaning of fields and irrigation systems
2. Drainage of fields and the reconstruction of irrigation systems
3. Support for replanting and production (tools, seeds and boxing sheds)
4. Rebuilding / repair of access roads, sheds and other structures

Figure 4: Damaged bana crops in Roseau Valley

3.3 Education

According to the Ministry of education, at least fifteen percent (15%) of schools suffered extensive structural damage. This includes schools with roofs blown off; heavy cracks in walls, floors completely damaged and washed away foundations. The RNAT only observed flooding damages in its assessments (Soufriere, Dennery, Canaries, Micoud, and Bouton). Additional information pertaining to other school damages was received from the Ministry of Education.

As a result of heavy flooding, 3-5 feet of siltation is left in some schools particularly in the Soufriere area. Leakage from ceilings has resulted in damaged resource materials, books, furniture,

equipment (computer) elsewhere. These schools include Dennery Infant and Dennery Primary, Canaries Infant and Canaries Primary, Entrepot Secondary, Vieux-Fort Secondary and Vieux-Fort Infant, Clendon Mason Secondary schools. At Dame Pearlette Louisy Secondary, the computer room is entirely destroyed as a result of 5 feet of water which flooded the school. There was extensive damage to sewer lines, fences, pipes and electrical fixtures.

The Ministry of Education has advised that school will remained closed until Friday, November 5, 2010. However, Government will issue the notice for re-opening of schools as deemed necessary.

Challenges

1. Lack of water- shortage of water to supply schools
2. Lack of electricity and telephone will affect the re-opening of schools
3. Inaccessibility to schools – Road and bridge to Bexon Combined and Anse La Raye Primary destroyed and therefore there is no way to access these schools.
4. Land slippage at between Bouton and Soufriere makes Bouton Combined inaccessible to some children from Soufriere town area.
5. Reporting to duty – Personal losses will affect teachers, principals, ancillary staff and it may be a challenge for them to report to duty.

Needs

1. A massive clean-up campaign is needed
2. Safe water at schools and surrounding communities – including restoration of water tanks
3. Furniture and equipment
4. Resource material and books
5. Ready packed meals for school feeding program

3.4 Shelter

Shelters in affected areas were opened Sunday, October 31, 2010 to accommodate persons. To date all shelter occupants have departed apart from those in the most severely impacted area of Fond St. Jacques, Soufriere where over 300 persons are now accommodated in six (6) shelters. This is the result of the Prime Minister's directive that was based on the engineer's recommendation to evacuate in the face of an expected tropical wave and further potential landslides.

The response of the sector targets people in shelter, those with host families and those that have lost their belongings.

Challenges

1. Overcrowding in Fond St Jacques' shelters
2. Uncertainty over numbers of women, men and children in shelter and therefore catering for specific needs
3. Provision of a safe environment for women and children
4. Access to water
5. Limited food
6. Supplies for sleeping

Needs

1. Short and medium term shelter needs (no specific time set, but expect it will take a while) until all clear to return to homes
2. Assessment of landslides risk and any necessary mitigation measures for displaced persons.
3. Sleeping materials – mattresses / cots / blankets (250 families)
4. Water and food supplies
5. Hygiene kits
6. Shelter management and psycho-social care.
7. Disease surveillance

3.5 Infrastructure

There are substantial damages to infrastructures reported in Saint Lucia following passage of hurricane Tomas (see detailed analysis in annexes). As a result, several populated areas were inaccessible up to 3 days after the event. Many infrastructures are still at risk should there be additional rain. Indeed, a significant amount of soil remains on the freshly exposed slope surfaces which may be mobilized with any significant rainfall. Re-mobilization of this material will result in (i) the contribution of sediment to the river valleys and (ii) the production of clay slurry on roads through the upland areas making travel unsafe for both vehicular traffic and pedestrians.

Most of the destruction is not the result of wind or flooding but from subsequent landslides which have cut roads, destroyed bridges and washed away entire river banks deep inside. The impact on the road system is variable with blockage by debris; erosion; and compromise loss of retaining structures (see image). Infrastructure is therefore a major concern with rehabilitation being a mammoth task. Most adversely affected areas are in the south west, with the greatest impact being in the Soufrière district. Additionally the disruption of the access to the tourist sites around Soufriere impacts the livelihoods of the local communities.

Figure 5: Destroyed road infrastructure

The landslides associated with Hurricane Tomas have impacted and continue to threaten the stability of some of the roads. As shown in the highway near LUCELEC, a significant road failure is evident. The initiation of road failure is also observed at another location along the road. However, no warnings were provided for the site where the failure was developing. These situations pose a risk to vehicular traffic and pedestrians, especially heavy vehicular traffic. It is likely that the frequency of heavy vehicular traffic on/along the highways will increase significantly in the near future due to the clean-up operations.

Removal of debris from slopes is essential for the recovery process to reduce vulnerability. However, this is a very high risk process as landslides may be reactivated during the process placing heavy machine operators at the base of the slide and persons working on slopes at considerable risk. It should be noted that soils removed from households and communities may be contaminated with various chemical products. The potentially contaminated soils are currently sitting along roadways awaiting collection and hauling to various sites around the country. Unregulated soil disposal can pose significant long term environmental damage to communities and the country.

Figure 6: Road failure near LUCELEC

Some of the effects are reported below: Soufriere, Barre Des L'Isle and Odsan.

In Soufrière, a major cleanup activity is required for the north-western wedge of the town which is enclosed by the Soufriere River. No significant structural damage to houses was observed, apart from those described as completely destroyed and moderately affected. There was hardly any observation of roof damage. The entire road along the front of the entrance to the hospital is destroyed and is now a major watercourse. At the Fond Cacao Bridge, the river has widened to almost two and half times the original width. The river has changed course significantly and has reduced some lots to about 50% of their original size. Cresslands is a major disaster area; with both the Cresslands Housing Development and the access road to Fond St. Jacques completely destroyed/devastated. The main access road to Fond St. Jacques at the Cresslands area is cut off by a massive crater approximately 50m by 60m by over 15m deep. In Fond St Jacques, 15 houses are completely destroyed; 19 suffered moderate damage and could be repaired.

A significant number of large landslides were observed along the span of highway extending from Canaries into the interior. This area is characterized by steep valley slopes with all of the slopes being covered by thick red clay soils that may have resulted from the weathering of the underlying volcanic rocks. These soils appear to be loose and extremely erosive.

Between Odsan and Ravine Poisson, flood waters inundated the entire stretch between both roads; a pedestrian bridge was completely destroyed, drains filled with silt and many power lines and poles are on the ground (50%).

Barre Des I'Isle is a major damaged zone with 15 major, 4 medium and 9 minor landslides on embankments above the road. Fortunately it is not a densely populated area.

In all areas there was little evidence of wind damage apart from banana plantations. Electricity poles (rated to 70mph wind resistance) were mostly intact apart from those affected by landslides and floods.

Needs

Immediate

1. Assess landslide risk. Any displacement, relocation, or authorization of reopening of roads should be done after thorough risk assessments. This is a priority in areas such as Fond St Jacques.
2. A road safety monitoring programme should be initiated, if not already in place, to identify those portions of the road network that may fail under various vehicular loads.

Figure 7: River in Canaries affecting the elementary school and playing field

3. It is highly recommended that geotechnical advice be sought to provide guidance related to stabilization of the current environment and long term actions to prevent a recurrence of this situation given that the combination of climate change and increasing climate variability may provide similar extreme weather events in the future.
4. Strategize the cleaning up operations. The focus should be on clearing sections of the river to prevent any further breaching of the walls by impending tropical events. Also, consideration should be given to the use of small mechanical equipment (like Bobcats) to clear the narrow streets, while at the same time reducing damage to asphalt surfaces.
5. Clearance of debris around bridges. There is a danger of collapse and life threatening flash floods. This should be accompanied by landslide assessments and slope stabilization. This should also involve a debris management plan.

Figure 8: Debris in river

Recovery

- Some examples of concrete mitigation works:
  - Increasing the heights of the Soufriere River wall is absolutely necessary, particularly in the area where the breach has occurred.
  - Training of the river is required in the Fond Cacao area, with the need to place extensive length river wall (over 500 ft.); most likely out of gabion baskets or in areas where there is sufficient land, armour stone or slope protection methods using rip rap. The Fond Cacao Bridge wing-walls must be reinstated and at minimum, the river must be retrained immediately near the bridge.
  - Significant clearing of the Cresslands Housing Development will be required with perhaps the need for either (a) major drainage considerations; (b) abandonment of the site; or (c) Performance of a detailed environmental impact assessment as reports from residents suggest that this is an area known to be prone to landslides.

- The Barre Des L'Isle has sustained major devastation and the slopes would require major stability action; Major retaining walls would be required; some may be as long as 50 metres and 12 metres high.

3.6 Response

The National Response Mechanism

The National Emergency Management Organization activated its NEOC on Saturday October 30, 2010 at 8:00 a.m. A national shutdown was issued by the Prime Minister at 6:00 a.m. Emergency shelters were ordered opened. The "All Clear" was given at 12:00 p.m. on Sunday October 31, 2010. The Hewanorra airport was closed due to flooding and did not reopen until Wednesday November 3, 2010. Initial damage assessment was carried out along with search and rescue.

The Regional Response Mechanism

The CDEMA Coordinating Unit established and maintained contact with the National Emergency Management Organization in Saint Lucia (NEMO SLU), on Friday October 29, 2010. The Regional Response Mechanism was placed on standby and the CARICOM Disaster Relief Unit (CDRU) was also placed on standby in preparation for deployment to Saint Lucia or any of the other two CDEMA PS that were being threatened. The Sub-Regional Focal Point (Barbados) was recovering from the impact of Tropical Storm Thomas, but was still able maintain radio communication with the NEOC (NEMO SLU) throughout.

The Eastern Caribbean Donor Group on Disaster Management (ECDGDM) met on Sunday October 31, 2010 at 3:00 p.m. and confirmed their pre arranged commitments. It was also agreed that a Rapid Needs Assessment Team would be deployed in support of Saint Lucia as requested by the Government of Saint Lucia.

Regional Response

- RSS - Provide air transportation to deploy the RNAT team, CDEMA & RSS
- CDEMA subregional focal point (Barbados)
- CDB - USD 200,000 Emergency Relief Grant offer to Saint Lucia.

Figure 9: RNAT members with Saint Lucia Government officials

The International Response Mechanism

- The International Federation of the Red Cross and Red Crescent (IFRC) and National Red Cross Societies (France)
  - Distribution of NFIs
  - Disaster Relief Emergency Fund (DREF)
  - Regional Appeal

- United Kingdom
    - DFID Officer
    - Her Majesty Ship, Manchester & Royal Fleet Auxiliary Wave Ruler : Aerial reconnaissance, SAR, Logistic support, Water provision & Hospital repairs

- United States
    - USD 50,000 for Relief Supplies and Operational Support
    - 100 boxes of plastic sheeting
    - 1000 Blankets
    - 1000 Hygiene Kits
    - 1000 five gallon Water Containers
    - Support for a Combined USAR Team to conduct Damage Assessment and Search and Evacuation Operations.
- Australia
    - AUS 100,000 (for CDEMA affected countries)
- CARICOM Development Fund
    - USD 20,000
- France
    - Helicopter Support for Search & Rescue operations in the Fond St. Jacques area
- Canada
    - CIDA - Water Infrastructure Specialist
- PAHO
    - Technical support (3 persons) - Water and Sanitation, Public Health and Disaster Specialists
- OCHA
    - Emergency Cash Grant (tbc)
    - Technical support (Regional Disaster Advisor joining the RNAT)
- UNDP
    - Coordination Recovery Grant (tbc)

Challenges

1. Communications was weak initially due to the damage to telephone poles, some landlines were unserviceable. Cell phones were not working in the northern areas
2. VHFs not working due to damage to the repeaters

3.7 Needs

The needs list at Annex A includes immediate needs where gaps were identified, but specifics on figures need to be refined in the second assessment based on current contributions. Medium and long term needs are also identified as are priority tasks.

3.8 Coordination mechanisms

The National Emergency Management Organization (NEMO) in Saint Lucia is responsible for responding to the needs after a disaster and coordinating the response at local, regional and international levels. NEMO comprises 12 National Disasters Committees (Transportation, Supply Management, Telecommunications, Damage Assessment and Needs Analysis, Information, Welfare, Stress Response Team, Emergency Works/Rehabilitation/Reconstruction, Shelter, Oil Pollution, Hospitality and Mitigation) and 18 district Disaster Committees.

At the national level, NEMO quickly responded to the emergency by deploying to affected areas in the immediate aftermath of the disaster and ensuring general coordination of the response. Daily briefs with the Prime Minister were held with national strategic players.

According to the Emergency Management Plan, the National Emergency Operations Centre (NEOC) is expected to be the centre from which all commands are issues and where all heads of essential services locate. Some Disaster Committees met during the emergency (i.e. Education, Shelter, transportation, Supply, Welfare, and Health) and continue to ensure sectorial response from their ministries, not from a central NEOC. Disaster Committees are responsible to inform NEMO of the situation and needs by sector, which should be reflected in NEMO's daily Situation Report. There was no activation of an international EOC (IEOC) which is based at the Ministry of External Affairs and is in charge of managing all international affairs concerning the disaster, namely donations and disaster relief.

At field level, the RNAT team witnessed in the areas assessed (Dennery, Soufrière, Micoud) an efficient response coordination and commitment from local committees. The first response communications between the NEOC and district Disaster Committees was hampered by collapsed telecommunications services. Operational coordination mechanisms were unclear and will need to be strengthened in the coming days.

A daily information brief took place every day between the Head of NEMO and the RNAT Team with other partners such as IFRC, USAID/OFDA. Only the Health national counterpart attended those coordination meetings.

Recommendations

1. The team recommends that national sectors (Disaster Committees) brief NEMO on the situation needs and response by sector on a more regular basis, ideally daily. This should be an information-sharing meeting at operational level.
2. The team also recommends that other international partners deployed to Saint Lucia join this operational information-sharing meeting so that every actor involved in the response is up to date on the situation and requirements.
3. This could take place every day in the NEOC at 6:00 p.m. Every Disaster Committee involved in the response could send a representative and input into the National Situation Report.

4.0 CONCLUSION

The impact of hurricane Tomas on Saint Lucia was a significant event in its history. Between 400 mm and 533 mm of rainfall fell in 24 hours, which represents approximately double what fell in 1994 during the passage of Tropical Storm Debbie. As a result, the major impact was due to landslides and flooding. Infrastructure suffered the most with a drastic reduction of water production to less than 1% of the situation ex-ante. Another major impact was to road network resulting in several key communication points cut and communities isolated.

There is urgent need for a comprehensive response from an immediate relief to recovery. Restoration of services and infrastructure is essential but equally so is the adoption of risk mitigation in the reconstruction planning.

*In short, Saint Lucia needs to **Build Back Better***

5.0 ACKNOWLEDGEMENTS

The RNAT Team would like to express its deep appreciation to the Director, staff and volunteers of NEMO for their support, hospitality and camaraderie. The team also wishes to thank the Regional Security System for facilitating transport to and from Saint Lucia. Finally, great esteem is expressed to the people of Saint Lucia for the strength in the face of adversity.

6.0 ANNEXES

A. Needs List and Priority Tasks

B. Assessment of Hydrology and Geological Risks – David Farrell

C. Report on WASH and Health – PAHO

D. Report on Agriculture Sector – Emmerson Beckles

ANNEX A - Needs List and Priority Tasks

NEEDS LIST
FOLLOWING THE IMPACT OF HURRICANE TOMAS
1ST TO 4TH NOVEMBER 2010

Immediate Needs and Priority Actions

Serial	Needs	Quantity	Donor/ Potential Donor	Remarks
1.	Safe water for drinking and personal use • Purification tablets - flocculation and disinfection; • Water storage and collection • Mobile water treatment plant	For population of 181,000		
2.	Blankets / Cots	For 250 families		For sheltered (250 families)
3.	School equipment and supplies	15 schools		
4.	Health equipment and supplies	2 facilities		
5.	Generators	12		Various sizes
6.	Temporary shelter: construction material	To be quantified		
7.	Clearing of streets, schools and houses	To be quantified		
8.	Health promotion and education as well as re-establishment of primary health services	Countrywide		
9.	Cleaning Materials	To be quantified		
10.	Hand sanitizers	To be quantified		
11.	Upgrading Richfond health center to offer emergency care	To be quantified		
12.	Clean-up campaign	To be quantified		
13.	School Furniture and equipment	To be quantified		
14.	Resource material and books	To be quantified		
15.	Ready packed meals for school feeding program	To be quantified		
16.	food supplies	To be quantified		
17.	Clearance of debris	To be quantified		
18.	Road safety monitoring programme	To be quantified		
19.	Support for replanting and production (tools, seed/seedlings and boxing sheds)	To be quantified		

Serial	Needs	Quantity	Donor/ Potential Donor	Remarks
20.	Fertilizer, bananas (WPK)	16,000 bags (4,000 ac)		
21.	Weedicides/Fungicides	To be quantified		
22.	Building materials for sheds and housing of livestock	To be quantified		
23.	Irrigation systems	To be quantified		
24.	Plastic covering	To be quantified		
25.	Rotor tillers	To be quantified		
26.	Fishing gear and nets, pots	To be quantified		
27.	Boat Engines	To be quantified		
28.	FADs	To be quantified		
29.	Safety at sea equipment	To be quantified		
30.	Fingerlings	To be quantified		
31.	Replacement stock	To be quantified		
32.	Feed	To be quantified		
33.	Equipment	To be quantified		
34.	Chemicals for livestock	To be quantified		
35.	Compensation packages	To be quantified		
36.	Cash for work schemes	To be quantified		
37.	Preparation of project proposals and funding requests	To be quantified		

Medium Needs and Tasks

Serial	Needs	Quantity	Donor/Potential Donor	Remarks
1.	Rehabilitation of water supply system	To be quantified		
2.	Restore functionality of Dennery Hospital	To be quantified		
3.	Rehabilitate road access to Soufriere hospital	To be quantified		
4.	Equipment and contents lost and Victoria Hospital's Pediatric and X-ray units	To be quantified		
5.	Hydrological engineer expertise to stabilize channels for rivers	To be quantified		
6.	construction of flood walls along rivers	To be quantified		
7.	Geotechnical expertise to develop strategies for stabilizing slopes	To be quantified		
8.	Water harvesting with filter	To be quantified		
9.	Infrastructure development	To be quantified		
10.	Support for field Irrigation	To be quantified		
11.	Modernization of production systems	To be quantified		
12.	Rehabilitation of plant and seedling nurseries	To be quantified		

Long Term Needs and Tasks

Serial	Needs	Quantity	Donor/Potential Donor	Remarks
1.	Increasing the heights of the Soufriere River wall.	To be quantified		This is absolutely necessary, particularly in the area where breaches occurred
2.	Training of the river in the Fond Cacao area, with the need to place extensive length river wall (over 500 ft.); The Fond Cacao Bridge wing-walls must be reinstated and at	To be quantified		The river must be retrained immediately near the bridge. Most likely to be made out of gabion baskets or in areas where there is sufficient land, armour stone or slope protection methods using rip

	minimum			rap.
3.	Significant clearing of the Cresslands Housing Development. need for either: (a) major drainage considerations; (b) abandonment of the site; or (c) Performance of a detailed environmental impact assessment.	To be quantified		Reports from residents suggest that this is an area known to be prone to landslides.
Serial	**Needs**	**To be quantified**	**Donor/Potential Donor**	**Remarks**
4.	Drainage and farm road development policy	To be quantified		
5.	Training/capacity building for farmers	To be quantified		
6.	Investment in agriculture sector	To be quantified		
7.	Mainstream of Disaster Risk Management in the sector	To be quantified		
8.	Value chain development	To be quantified		
9.	Strengthening the data/information systems and damage assessment process	To be quantified		
10.	Strengthening of Extension Unit of the Ministry	To be quantified		
11.	Marketing development	To be quantified		

Priority Tasks

Serial	Action Required	Responsibility	Action taken
12.	Provision of assistance to affected families	Government of Saint Lucia	
13.	Clearing of streets, schools and houses	Government of Saint Lucia	
14.	Health promotion and education as well as re-establishment of primary health services	Ministry of Health	

15.	Repair of river banks at the earliest to avoid future floods		
16.	Repair Water supply infrastructure	WASCO	
17.	Develop strategies for stabilizing slopes and identifying and prioritizing	Geotechnical expertise	
18.	Critical actions to mitigate future flooding and slope failures	Ministry of Works	
19.	Stabilize channels for rivers including construction of flood walls	Hydrological Engineer	

ANNEX B - Assessment of Hydrology and Geological

Assessment of Hydrology and Geological Risks
David Farrell, Principal, Caribbean Institute for Meteorology and Hydrology
Day 1 – 2nd November 2010

Preliminary assessment of the rainfall data for Saint Lucia on October 30, 2010 indicate that disaster was triggered by an extreme rainfall event. Preliminary rainfall measurements received to date from the Meteorological Service and the Ministry of Agriculture indicate that on October 30, 2010, the airport in Castries received approximately 533 mm of rainfall, Desrache received approximately 461 mm, Forestiere received 450 mm, Anse La Raye received 404 mm and Hewanorra airport received 347 mm of rainfall. This amount of rainfall within 24 hours concentrated in many of the short steep-valley watershed on Saint Lucia triggered the flooding and landslides. The conditions for landslides were favorable due in part to the reduced levels of vegetation on slopes that may have been caused by the summer drought. While the aging infrastructure in Saint Lucia would have contributed to the significant amount of loss experienced, the extreme nature of the event would have resulted in significant impacts to more up-to-date infrastructure. Return periods for this rainfall event will be calculated.

The massive amount of flooding coupled with the wind damage resulted in a significant amount of material being deposited in the river channels. **It is important that much of this material that is blocking the channels be removed as quickly as possible to prevent further flooding from smaller future events**.

Focus on collecting geospatial data to get an understanding of the spatial distribution of hazards and vulnerabilities in an effort to understand the extent of loss and future risks to communities and infrastructure. It appears that there is no coherent approach and coordination with respect to organizing geospatial data. This makes it difficult for persons unfamiliar with the environment to quickly come up to speed with respect to the spatio-temporal characteristic of risk, hazards and vulnerabilities. CIMH will construct an initial GIS for this effort.

The lack of water over the next 1-2 months will pose challenges to the society and operations of government and the private sector and can result in stressful societal situations. Examples of the social challenges that may result from water shortages are exemplified by the situation in Jamaica during the 2009-2010 droughts.

The current situation requires that additional sources of water be brought into the distribution system. Such sources that are currently being considered include water harvesting, barging water from neighbouring countries and rehabilitating former sources of water. Depending on the costs of bringing these sources into production and the volume of water that can be delivered from these systems, especially given the fact that the region is coming to the end of its annual wet season and transitioning to the dry season, additional sources of water may be required if the original sources of water cannot be brought back into production. One option may be to consider introducing sources of groundwater into the distribution system. Wells may be constructed in

alluvial valleys near distribution lines where there is demand. These wells may be placed in reserve when the original system is brought back into production.

Day 2 – 2nd November 2010 - Field Trip to the East and the West Coasts

Hydrology and landslide observations were conducted along portions of the east and the west coast and some central portions of the island. Several observations were made and, where applicable, are supported by photographs taken at various locations along the trip. In most cases the locations of the photographs are provided. As noted in the previous inputs to the report, the 24-hour rainfall accumulations at various location on Saint Lucia on October 30, 2010 due to Hurricane Tomas exceeded 450 mm with recorded rainfalls at Vigie Airport (George F.L. Charles International Airport) exceeding 500 mm. Rainfalls on Barbados due to the same tropical storm were approximately 50 percent of those recorded in Saint. These rainfalls must be viewed as extreme. The return period for the event on Saint Lucia will be provided in the near future.

Key observations from the trip are summarized in the following bullets:

Landslides:

- A significant number of large landslides were observed along the span of highway extending from Canaries into the interior. This area is characterized by steep valley slopes with all of the slopes being covered by thick red clay soils that may have resulted from the weathering of the underlying volcanic rocks. These soils appear to be loose and extremely erosive. These soils form a large part of the erosional debris caused by the rainfall associated with Hurricane Tomas.
- In the Canaries region, a wide valley emerges from the foothills of the mountains and extends eastward the sea. A large volume of debris from the landslides generated from the high rainfall event on October 30, 2010 now fills the river channels in the flat areas in the Canaries region due to the reduced stream velocities. This debris consists of both soil and trees which now choke the river channels. In the Canaries area, a significant amount of clay slurry has been transported in the streets and homes with the former impeding traffic and flooding homes. In many cases, the slurry that has been removed from the road and homes has been piled up next to the highway to be removed by Government or private haulers. This practice poses not only a transport concern but it can be easily re-mobilized in the event of heavy rains and contribute to further flooding.
- In the upland areas many fresh landslide scars are obvious. Along the highway from Canaries towards the interior most slopes show signs of extensive erosion. Those slopes not showing landslides are covered with trees and thick undergrowth. This vegetative cover likely mitigated the triggering factors for landslides. A significant amount of soil remains on the freshly exposed slope surfaces which may be mobilized with any significant rainfall. Re-mobilization of this material will result in (i) the contribution of sediment to the river valleys and (ii) produce a clay slurry on roads through the upland areas making travel unsafe for both vehicular traffic and pedestrians. It is imperative that the soils on the exposed slope surfaces be stabilized. From the perspective of risk, stabilization of hill slopes along roads should be given the greatest priority as they impact the national

transportation system and therefore impact emergency response efforts. The next level of priority should be given to those slopes that will contribute to stream sediment loads as these can influence flooding which can also influence transport. It is also important to note that this debris from these slopes can create dams along river channels. If these dams subsequently fail they can result in catastrophic flooding. Many communities are built along or adjacent to steep slopes and, as a result, are vulnerable to landslides. This vulnerability was exposed by the landslides triggered by the passage of Hurricane Tomas. It is clear from the field trip that many homes are threatened by either very local slide that are undermining the foundation of an individual home or by extensive landslides that impact entire communities. The approach to prioritizing and mitigating this risk level is a sensitive issue which depends on available housing stock for relocation and the cost of mitigation (short and long term). This is requires a political decision.

- The landslides associated with Hurricane Tomas are impact the stability of some of the roads. Sections of the highway near LUCELEC heading towards the east coast. One major failure, taking up half of the highway was observed. A second failure, 100 to 200 metres away was beginning to initiate. A portion of one side of the highway was cordoned (along the line of the failure) to vehicular traffic. No warnings were provided for the second site where the failure was developing. These two situations pose a risk to vehicular traffic and pedestrians, especially heavy vehicular traffic. It is likely that the frequency of heavy vehicular traffic on this highway and along other highways will increase significantly in the near future due to the cleanup operations. A road safety monitoring programme should be initiated, if not already in place, to identify those portions of the road network that may fail under various vehicular loads.
- Soils removed from households and communities may be contaminated with various chemical products. The potentially contaminated soils are currently sitting along roadways awaiting collection and hauling to various sites around the country. The basis for the selection of soil storage/disposal sites is currently unknown. Because these soils may be contaminated with various chemicals and, given the urgent need to remove them from communities, it is recommended that potentially contaminated soils and debris be stored at temporary interim facility where they may pose minor environmental damage until permanent storage/disposal sites based on sound science, land use considerations and appropriate policies can be identified. Unregulated soil disposal can pose significant long term environmental damage to communities and the country.
- Removal of debris from slopes is essential for the recovery process as it reduces vulnerability. However, this process is a very high risk activity as landslides may be reactivated during the process placing heavy machine operators at the base of the slide and persons working on slopes at considerable risk. It is recommended that persons with the requisite skills be assigned to supervise debris removal operations at the locations of large slides to ensure the safety of operations. It is also recommended that Government employees and contractors working at such sites be given some level of information or training to ensure the safety of operations at sites.
- Given the challenges posed by unstable slopes and soil to recovery efforts and long term

development objectives following the passage of Hurricane Tomas across Saint Lucia, it is highly recommended that geotechnical advice be sought to provide guidance related to stabilization of the current environment and long term actions to prevent a recurrence of this situation given that the combination of climate change and increasing climate variability may provide similar extreme weather events in the future.

Hydrology/Water Resources

- The general consensus is that there will be significant water shortages in Saint Lucia due to damage to the water delivery infrastructure and the electricity infrastructure. One observation is that the heavy reliance of Castries on the John Compton Dam introduces a significant amount of risk into the water supply system as a failure of the dam or the related delivery system leads to significant water shortages in Castries. It is recommended that this mode, which sees Castries relying heavily on a single water source, be revised to reduce water supply risks to Castries. Options that should be considered include development of groundwater supply wells near communities and small impoundments along some rivers near to existing water distribution network.
- The passage of Hurricane Tomas has resulted in a significant reconfiguration of parts of some river systems that increase the vulnerability of some communities and physical infrastructure to flooding and erosional damage. Returning key sections, if not all sections, of these river systems to their prior state or some new optimal state that reduces vulnerability is essential. Achieving this objective in a cost effective manner is important. As a result, it is highly recommended that the services of a hydrological or hydraulic engineer are critical.

ANNEX C - Report on WASH and Health

HEALTH & WASH RNA

Event / Disaster:	**Hurricane Tomas**
Date event occurred:	**30 October 2010**
Impacted zone:	**St. Lucia**
Report date:	**03 November 2010**

Brief event description: deaths, injuries, displaced population, destroyed households

DEATHS: 7 confirmed [5 Soufriere, 2 Castries]

INJURIES: Numbers unavailable. Regular disease surveillance has been interrupted due to communication challenges (internet, phone) and transportation difficulties. Active surveillance to be instituted to ensure daily reporting, especially in the shelters and areas prone to diarrheal diseases. This aspect remains an area of vulnerability and general concern. Note: Plan for heightened surveillance necessary, which considers the existing constraints and prevailing secondary risks to health;

SHELTER: ~ 357 in 5 shelters in Fond St. Jacques. An evacuation order was issued last night for areas of the community which were considered highly vulnerable to landslides. This has accounted for the increase in numbers. The shelters have drinking water but none for other personal uses, including cooking and washing. The MoH wants to provide purification tablets. Uncertain when public supply will be reconnected. Excreta disposal is an issue. The Ministry of Health has indicated plans to build 8 ventilated improved pit latrines. PAHO has however recommended that at least 16 be provided for the 400 occupants. It is uncertain the duration of stay in the shelters, since many houses have been either destroyed or damaged (see RNAT report 2). Solid waste management is presently an issue, but with access restored, is expected to be resolved soon.
10 – 20 in 3 shelters, (Soufriere Town – mainly night residents). Water reconnection for town expected today.
Environmental health and disease surveillance to be heightened.

2. Impact of the event:
Impacts on water/environment: (dinking water, vectors, negative environmental impacts, negative changes in services including drinking water, power, trash collection):
Water: No health facility (including MoH HQ) presently has piped water. Safe water delivery is a priority. Water truck cleanliness and use of water from drains and rivers are of concern. Short and long term water –related needs include: water mains, pipes and fittings, lime, rainwater tanks and water disinfectant. Limited amounts of water are being trucked, which is draining storage tanks. Of the 36 health facilities, only Richfond and La Resource Health Centers have rainwater catchment tanks. Both at presently at one third of their 3000 L capacity. These facilities are part of a rain water harvesting pilot project implemented in collaboration with CEHI. The Victoria Hospital presently has one week supply remaining in storage tank.
The northern catchment area with a demand of 8-10 MGD per day is expected to be restored to some 3 MGD in the next two month. It is anticipated that of this 2MGD will be available by end of this week.
See report prepared by Eng. Adrianus Vlugman (Annex 3).

MOH Strategy:
Today water was sourced from the Sandals Resort Desalination plant and trucked to the facilities in the North of the island. Hopefully tomorrow potable water can be sourced from Hill 20 reservoir for the north, but no arrangements have been made for the South.
In the short term, WASCO will truck water on MoH's request to health facilities. Also exploring option of trucking and purifying river water for toilets, etc. Issue however with reluctance of drivers to transport river water and also with storage.
For the medium term, plans are to expand the rain harvesting program to all facilities. As such assistance is being sought to acquire 800 Gallons tanks for water storage.
For the communities: the Ministry of Health is recommending two strategies: 1) Collection of rain water which requires boiling or disinfection before drinking and 2) Sourcing of water purification tablets (coagulant +disinfection) to render river water potable.
Health promotion and education and ongoing water quality control, to include chlorine residual testing and bacteriological analysis of treated water will be key components of this strategy. 30 water testing kits/reagents required. PAHO has been working with MoH to package message for treatment of water using chlorine bleach.

Sanitation: solid waste management disrupted in many communities. Particularly concerning in Soufriere. Large accumulation of mud and debris associated with flooding un-cleared. A few septic tanks have been washed away, primarily in Soufriere, resulting in effluent discharge into drains and sub surface areas. River water is being used for clean-up, flushing of toilets etc.
Food safety and vector control are critical issues in light of the foregoing.
FS Strategy: Public education campaign; ongoing assessment and monitoring of food establishments.
VC Strategy: Public education, source reduction, larvicidal and adulticidal interventions.
There is also a major concern for increased morbidity of leptospirosis and bilharzias, both endemic to the affected areas, in the south, especially since the rivers are now being heavily used. Dengue is also of concern, considering recent incidence. Soufriere also reportedly has highest incidence of gastroenteristis in the country.

c. Impacts on health and other infrastructure (e.g., hospitals damaged):
Roof damage: 2 (Gros Islet PolyClinic, Dennery Hospital)
Flooded: 2 (Castries & Vieux Fort) – Already addressed.
Leaking: 2 (Victoria & Soufriere) Issues with Soufriere hospital roof and laundry area addressed by the UK. Primary issue now is restoring road access.
Access blocked: 2 (Mental Wellness Center; Ti Rocher H/C)
Main issue is continuity of services which were offered by Dennery hospital. All equipment and supplies in that facility were destroyed/damaged. Primary health care services have been relocated to La Resource and medical services to Richfond. Need for supplement in equipment and supplies to address surge in these two facilities. Ministry of Health has addressed some needs and required external assistance for others (Annex 2).
It is however noted that Richfond when upgraded will only be able to provide emergency care but no admission due to lack of space.

General Information on principal health sector measures (Ministry of Health, PAHO, UN, Red Cross, other entities).

- MoH: Medical supplies and other lifeline items (e.g. water) augmented in facilities, especially in those receiving surge due to inoperability of damaged facilities, as well as in those experiencing surge as a result of impact on the community.
- French helicopter mission to Fond St. Jacques, for reconnaissance, to deliver supplies and

transport health personnel.
- IFRC/Red Cross: distribution of bottled water and non-food items to shelters across the island; bringing in 1 full kit watsan 4m3/h => 5000 beneficiaries.
- UK: supplied generator to shelter in Fond St. Jacques (refer to RNAT report 1 of yesterday – access by road now re-established to this community) and petrol station in Soufriere, bottled water & search and rescue in Fond St. Jacques, Soufriere hospital repairs (roof and laundry room repairs); 16000 puritabs and 300 tonnes.
- Easter Caribbean Donor Group: conducting rapid needs assessment
- OFDA Relief plane with Plastic Sheeting, Blankets, Water Jugs and Hygiene Kits arriving 04 Nov
- PAHO deployed three specialists to support disaster response operations (WATSAN, Public Health (arriving 03 Nov) and Disaster)
-PAHO is issuing appeal for health emergency needs
- PAHO is assessing the Dennery hospital infrastructure

Most urgent health sector needs

Generally three main areas:

- Provision of safe water to ensure continuity of health delivery services
- Prevention of outbreaks of water/food, vector borne and skin illness and disease.
- Re-establishing critical services offered by the now decommissioned Dennery hospital

The Ministry of Health has requested PAHO's assistance to address the followings identified urgent needs:

Technical Assistance to:

- Rectify water supply issues
- Assess integrity of damaged health infrastructure
- Provision of two midwives to be stationed at Soufriere Hospital for two months

Health Supplies/Equipment:

- Water supply in health facilities – purification tablets
- Bottled drinking water – 1000 cases (available in St. Lucia)
- 12 Generators
- 12 Water Tanks (800 gallons)
- Medication (antibiotics, ORS, IV Fluids, analgesics)
- Cleaning materials, hand sanitizers, floor equipment, cleaning materials
- Medical equipment (list attached – Annex 1).
- 20 body bags

Other:

- Reconstruction of Dennery Hospital
- Re-roofing of the Pediatric wing at Victoria Hospital
- Reconstruction of water supply
- Portable/mobile water treatment facilities

PAHO and the MoH are presently reviewing the needs. This list is likely to change

Prepared by: PAHO

Annex B1

EMERGENCY LIST OF MEDICAL EQUIPMENT SUBMITTED BY Ministry of Health

1. I .V. Poles
2. B/P Monitors – Digital & Analog
3. Pulse Oxymeter
4. Cardiac Monitor – 1
5. ECG Machine- 1
6. Defibrillator – 1
7. Doppler – 2
8. Transformers
9. Resuscitator
10. Incubator
11. 4 Pack – delivery
12. Suction machine- 2
13. Basinet – 2
14. Diagnostic sets – 2
15. Humidifiers
16. Trash carts
17. Medication Trolleys
18. Digital Thermometers
19. Scissors
20. Tooth forceps
21. Non-Tooth forceps
22. Thermostats
23. Needle Holders – medium
24. Needle Holders – large
25. Artery Forceps – curve
26. Artery Forceps – straight
27. Bowls – small, medium & large
28. Kidney dishes – small, medium & large
29. Urinals – 5
30. Bed pans - 5
31. Gallipots
32. Infant scale
33. Desktop B/P monitors
34. Glucometres
35. Large Filing Cabinets – 2
36. Desks - 2

Annex B2a (See Annex 2b on Excel Spreadsheet)

Hurricane TOMAS, St. Lucia
Report on Water Supply, 2 Nov 2010

Attached table shows the 28 different water production facilities in St. Lucia, with a total maximum production of some 17 MGD (in the rainy season) of which 70% comes from two sources, the Roseau Dam and the Millet intake. Millet and Roseau Dam provide water for the northern part of St. Lucia where the demand is some 8-10 MGD. All production facilities, except Bellevue supplying Vieux Fort (0.14 MGD), were out of operation as of 18:00 hrs, on 2 Nov 2010.

Some intakes are destroyed, washed away, several miles supply mains are washed away, several pump stations are either destroyed, mud-filled and without electricity. (see pictures of the Roseau Dam and landslides).

WASCO is mapping the extent of the damage using attached spreadsheet, indicating needs and duration for repair and cost estimate. However, as of this evening several assessment reports are still pending. A list with immediate and medium to long term needs is pending. It is expected that some smaller production facilities will be operational within the week, but the main intakes and supply main will be out for several weeks, maybe months. WASCO also indicated the need for skilled manpower to assist in the assessments and rehabilitation.

Major repair works are required to restore water supply to the nation, the costs to be finalized, and likely several millions US$$.

The lists with needs (short and long term) will include: Water mains, pipes and fittings, lime, water disinfectant (for public supply and domestic use), rainwater tanks for domestic and institutional use.

Domestic water disinfectants will be of the flocculant-disinfectant type (PuR or Chlor-floc) to be able to treat the turbid water.

In the mean time limited amounts of water are trucked were possible, slowly draining the filled storage tanks. This supply will have dried up in a few days. Gatherings of agitated people demanding water have been reported at WASCO's water reservoirs.

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		Production Facilities	Intakes	Type of intake	design capacity MGD	Design Capacity M3/D	Operational as of 2 Nov 2010	Cost to repair (XCD$)	Duration of repair	Remarks
Northern Watershed (Castries Gros Islet)	1	Theobalds Ciceron	Roseau Dam	Pump	6.00	27,276	0%			
			Millet Intake	Gravity	6.00	27,276	0%			6 MGD max in rainy season drops down to <1MGD in dry season
	2	Hill 20 Gravity	Piton	Gravity	0.35	1,591	0%	$ 28,000	2 weeks	
			Louisy-Joseph	Gravity				$ 28,000		
			La Sociere	Gravity				$ 28,000		
			Intake 4	Gravity				$ 28,000		
			Intake 5	Gravity				$ 28,000		
Southern Watershed	3	Forestierre		Pump	0.02	91	0%			
	4	Desbarras		Pump	0.02	68	0%			
	5	Desramdeau		Pump	0.02	91	0%			
	6	Anse La Raye		Pump	0.10	455	0%		1 week	
	7	Grace		Pump	1.50	6,819	0%		??	Unaccessible
	8	Thomazo		Pump	0.10	455	0%		1 day	
	9	Dennery	Errand #1	Pump	0.20	909	0%		3 weeks	600ft (30 lengths) of 8” PVC pipe
			Errand #2	Pump					1 month	1,000ft (50 lengths) of 8” DI
	10	Aux Leon		Pump	0.05	227	0%		1-2 month	
	11	Deniere		Pump	0.10	455	0%			
	12	Patience		Pump	0.13	591	0%			
	13	Micoud		Pump	0.12	546	0%		?	
	14	Desruisseaux		Pump	0.19	864	0%			
	15	Belle Vue (VF)		Pump	0.14	636	100%			In good condition
	16	Pierrot (VF)		Pump	0.01	45	0%			

	17	Beausejour (VF)		Pump	0.85	3,864	0%		1 day	
	18	Toucousson		Pump	0.06	273	0%			
	19	Delcer		Pump	0.28	1,273	0%		4 days	
	20	Lower Diamond		Pump	0.06	273	0%			
	21	Upper Diamond		Pump	0.10	455	0%			
	22	Ruby		Pump	0.17	773	0%			River Intake destroyed
	23	Lower Fond St. Jacques		Pump	0.17	773	0%			inaccessible
	24	Upper Fond St. Jacques		Pump	0.06	273	0%			inaccessible
	25	Upper Saltibus		Pump	0.05	227	0%		1 month	
	26	Bouton		Pump	0.01	41	0%			
	27	Anse La Verdure		Pump	0.04	182	0%			
	28	Canaries		Pump	0.10	455	0%		1-2 month	
					16.99	**77,255**		**140,000**		

Errand #1				0			3 weeks	600ft (30 lengths) of 8” PVC pipe
Errand #2				0			1 month	1,000ft (50 lengths) of 8” DI
Sauzy				0			1 month	
Marquis & Talvan			0.45	2,046		$ 10,000	4 days	desilting
Aux Leon		Pump	0.05	227	0%		2 month	1950ft (100 lengths) of 4” DI pipe preferably, or PVC.
Vanard							1 week	

Agriculture Sector – November 3, 2010

Assessment

By Emmerson Beckles, Senior Programme Officer, FAO

On November 3, 2010, a mission was conducted to Roseau Valley and its environs, a major part of the Agriculture belt in Saint Lucia and discussions were held with Technical officers of the Ministry of Agriculture. The following situation on damages to the sector and responses for rehabilitation were extracted :

1. Bananas
    a. Impact– 80-90% loss
    b. Number of farmers selling banana – 1189
    c. Production- 655 tons per week
    d. Acreage under production– 5500 – 6000 acres
    e. Income per week from sales – XCD $2 million
2. Vegetables
    a. open field (water melon, tomato, sweet pepper, chives) – 80 acres loss
    b. Green houses – approximately 60% of the existing 180 units under production damaged
3. Root crops
    a. Impact - estimated 20 % loss
4. Fruits

    While trees were not damaged, those producing namely citrus, breadfruit, pawpaw, experienced approximated 60% fruit loss.
5. Fisheries
    a. 14 engines submerged in Gros-Islet, Vieux-Fort and Canaries
    b. 1 fishing vessel damaged
    c. 1 seine net damaged
    d. No estimate on fish pots lost at this time
6. Aquaculture Facility
    a. Union Facility
        i. Fish killed and flooding of ponds
        ii. Estimated damage EC $375,000
    b. Vieux Fort Facility
        i. Estimated damage EC $38,000
    c. Fish and Shrimp Farmers
        i. Estimated damage EC $785,000
    d. Seamoss farmers – 4 in place
        i. Estimated loss EC $83, 000

Based on this preliminary assessment, the total loss to Fisheries and Aquaculture is EC 1.475 million.

7. Infrastructure

a. Irrigation system in Cul-de-Sac, Roseau Valley, Micoud, Mabouya Valley, Marquis
b. Farm sheds of banana farmers
c. Farm roads
d. Drainage systems
e. Landslides in agriculture areas e.g. Fond St. Jacques
f. Loss of farms due to river activity

8. Forestry
    a. Minimum tree damage
    b. Landslides
9. Livestock damage
    a. 40 cows at Cul-de-Sac and Roseau valley drowned
    b. Poultry – lost birds and housing
    c. Pigs – housing and animals

Immediate Needs

Banana

1. Land cultivation – bananas, other crops
2. Drainage – bananas, 3000 acres
3. Fertilizer, bananas (WPK) – 16,000 bags (4,000 ac)
4. Weedicides/Fungicides
5. Building materials for sheds
6. Planting material

Other Crops

7. Fertilizer
8. Building materials for sheds
9. Seed/seedlings
10. Irrigation systems
11. Plastic covering
12. Land preparation
13. Rotor tillers

Fisheries

14. Fishing gear and nets, pots
15. Engines
16. FADs
17. Safety at sea equipment
18. Cleaning of fish ponds
19. Fingerlings

Livestock

20. Building material for housing
21. Replacement stock
22. Feed

23. Equipment
24. Chemicals for livestock

Infrastructure

25. Clearing of farm roads
26. Repair of farm roads
27. Land clearing

Other

28. In depth damage and needs assessment
29. Compensation packages
30. Cash for work schemes
31. Preparation of project proposals and funding requests

Medium/Long Term Programmes/Recommendations

1. Training/capacity building for farmers
2. Investment in agriculture sector
3. Mainstream of Disaster Risk Management in the sector
4. Infrastructure development
5. Irrigation rehabilitation/development
6. Value chain development
7. Strengthening the data/information systems and damage assessment process
8. Modernization of production systems
9. Strengthening of Extension Unit of the Ministry
10. Marketing development
11. Rehabilitation of plant and seedling nurseries
12. Drainage and farm road development policy
13. Water harvesting with filter