



Addressing Disaster Waste Management Issues II

Follow up Mission Report

*Turks and Caicos Islands
6-14 December 2008*

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**Joint UNEP/OCHA Environment Unit mission
supported by the Swedish Rescue Services Agency***



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** On 31 December 2008, the Swedish Rescue Services Agency (SRSA) ceased operations. From 1 January 2009, a new, consolidated authority, the Swedish Civil Contingencies Agency (MSB), has been responsible for matters concerning societal safety, i.e., emergency prevention, planning, preparedness, response and recovery, and civil defence. MSB is active in both domestic and international humanitarian operations.*

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Executive summary

Hurricane Ike struck the Turks and Caicos Islands (TCI) on Saturday 7 September 2008. The islands had already been hit by Tropical Storm Hanna. Most severely affected in TCI were Grand Turk, South Caicos and Salt Cay islands.

A United Nations Disaster Assessment and Coordination (UNDAC) mission took place between 8 and 21 September 2008, during which an UNDAC-trained environmental expert undertook an environmental assessment and identified an urgent need for additional assistance to address disaster waste management issues. Upon receiving an official request for assistance, the Joint UNEP/OCHA Environment Unit (JEU), deployed a solid waste management expert through the Swedish Rescue Services Agency (SRSA) to assess disaster waste management issues on the islands of Grand Turk, South Caicos and Salt Cay in order to identify urgent needs of support, and to develop a disaster waste management plan and practical guidance for the local authorities. The mission was undertaken between 25 September and 16 October. A follow-up mission was conducted between 6 and 14 December 2008.

The major conclusion of the Disaster Waste Management Assessment was that the collection of disaster waste on **South Caicos** and **Salt Cay** islands was largely completed. The collection of waste from the destroyed power grid was under control. Progress was still needed regarding waste treatment and clean-up of the dump sites on the islands. It should be possible to introduce the most urgent measures during the current hurricane season. On **Grand Turk** island, the situation had improved considerably due to emergency clean-up measures taken immediately after Hurricane Ike hit the island, but additional assistance in the form of equipment and the necessary skilled personnel was needed.

During the follow-up mission it was found that there was still an immediate need of support. Efficient equipment (a grapple) is needed for removing the disaster waste from the streets, as it cannot be removed with the equipment utilized today. The grapple is also needed for sorting trees and branches from the disaster waste at the dump site. During the mission, the Caribbean Development Bank (CDB) provided funding for the purchase of a grapple.

It was also noted that collection and disposal of transformers had been carried out by the Environmental Health Department. The main reason for this was to minimize the negative impact of oil spillage from broken transformers.

The collection of electricity poles was partly solved by letting private people salvage the poles and reuse them. There is still a need to collect the remaining poles but it is not a significant issue.

One major concern is that the dump site on Grand Turk island has to be improved. The dump sites at South Caicos and Salt Cay will be replaced with transfer stations and the final destination for the waste will be the new landfill in Providenciales. The recommendation is that the old dump sites on the two islands would serve as auxiliary sites in preparedness for future disasters.

1 Introduction

1.1 Context

After Tropical Storm Hanna had already impacted the Turks and Caicos Islands (TCI), Hurricane Ike struck on Saturday 7 September 2008. At the time of impact, Ike was a Category 4 storm on the Saffir-Simpson Scale. The most affected islands in TCI were Grand Turk, South Caicos and Salt Cay. In view of this situation, the TCI government declared Grand Turk and South Caicos islands disaster areas, due to the extent and magnitude of damage and number of affected persons.¹



The TCI are a British Overseas Territory made up of 40 islands, eight of which are inhabited and located at 21 45 N, 71 35 W southeast of the main Bahamas, north of Hispaniola and 914 km (494 nautical miles) from Miami in the United States, with a total area of 430 km², and a coastline of 389 km. The islands have a total population of around 22,352², of which approximately 70 percent live in Providenciales in the Caicos Islands. The total population at South Caicos and Salt Cay is estimated to be 2,000 and 350 respectively. It was estimated that between 5,500 and 6,000 people were affected on Grand Turk.

The tropical and marine climate is moderated by trade winds. The terrain is low and the ground consists of flat, often porous, limestone featuring extensive marshes and mangrove swamps. The islands have limited natural fresh water resources and rely on cisterns to collect rainwater for drinking. The primary natural resources are spiny lobster, conch and other shellfish. With regard to natural hazards, as the islands are relatively low-lying, they are vulnerable to hurricanes and flooding, as exemplified by the 2008 hurricane season.

Major disasters, such as Tropical Storm Hanna and Hurricane Ike often have acute, negative environmental impacts that can threaten human life and welfare because of flooding and/or extreme wind. Possible consequences include damage to industrial facilities containing hazardous materials, as well as increased likelihood of erosion and landslides.

In order to assess the environmental impacts of storms Hanna and Ike, an environmental expert – who was part of the United Nations Disaster Assessment and Coordination (UNDAC) mission that took place between 8 and 21 September 2008 – undertook an environmental assessment to identify urgent and life-threatening secondary risks. Key concerns identified during these assessments included disaster waste management and disposal of debris. In order to address these issues, and with the support of the Swedish Rescue Services Agency (SRSA), a waste management expert was deployed by the Joint UNEP/OCHA Environment Unit (JEU) to undertake further disaster waste management assessments on Grand Turk, South Caicos and Salt Cay islands. The main focus for the mission was to identify urgent needs of support and to develop a disaster waste management plan. The mission is presented in a report issued by the JEU and SRSA in November 2008.³ The present report covers a follow up of previous findings and assessments⁴ of the

¹ United Nations Disaster Assessment and Coordination (UNDAC) Situation Reports.

² The World Factbook (CIA).

³ The report is available at <http://ochaonline.un.org/ochaunep>

disaster waste situation on TCI and gives recommendations on how to address urgent issues and mitigate more long-term issues, as well as how to prepare for future disasters.

1.2 The task

This follow-up mission was arranged in order to evaluate the progress on the islands during the recovery phase and identify any need for external support. It would also reflect gender aspects on disaster waste management.

1.3 Methodology

Based on the findings and recommendations of the aforementioned disaster waste management assessment, a follow-up mission was carried out in cooperation with the Department of Environmental Health at Grand Turk.

Follow-up activities comprised the following steps:

1. Field assessment of the quality of disaster waste collection. Special interest was paid to transformers and wires from the collapsed electrical grid, cables from the downed telecom and internet system, and debris - including trees and branches.
2. Inspection of the status of the incinerator for infectious waste at the hospital, including the collection of general waste.
3. Inspection of the situation at the dump site, including the nearby site where scrap cars and other steel debris is gathered.
4. Interviews with Environmental Health Officers (EHOs) and other relevant persons regarding gender aspects of disaster waste management.
5. Meeting with the Governor and the heads of the Disaster Management Department, the Planning Department and the Environmental Health Department. Two EHOs also participated in the meeting.

The evaluation was an interactive process mainly including EHOs from the Environmental Health Department.

⁴ Addressing Disaster Waste Management Issues. Mission Report and Recommendations. Turk and Caicos Islands 25 September – 16 October 2008. *Joint UNEP/OCHA Environment Unit mission*, supported by the Swedish Rescue Services Agency.

2 Evaluation

On 8 December it was officially stated that the recovery operation following Tropical Storm Hannah and Hurricane Ike had been completed on South Caicos and Salt Cay islands. Independent of the disasters, there is still some work to do at the dump sites. The government intends to replace the dump sites on the two islands with transfer stations for regular waste in order to send the disaster waste to the sanitary landfill in Providenciales. This would be an important action to improve environmental protection.

It is recommended that the old dump sites not currently being utilized at South Caicos and Salt Cay are maintained as a preparedness measure in case of future unexpected rapid increase of waste. In the event of a new disaster, the lack of such a precautionary measure would prove a formidable logistical challenge when all the waste has to be shipped to Providenciales.

With this situation in mind, the follow-up mission, as thus the following part of this report, focused on the situation at Grand Turk.

2.1 Disaster Waste Collection

As a part of its contingency work, the Environmental Health Department of Grand Turk mobilizes a contractor every time there is a risk for a hurricane hitting the island. The contractor then relocates appropriate equipment to a site where it is more readily accessible for clean up. These measures were also taken before Tropical Storm Hanna and Hurricane Ike impacted TCI.

The first clean-up phase after the storms was completed fairly quickly. However, during the September/October mission there were still piles of debris and other waste material to be found in the streets. By mid-December, the waste on the island had been cleaned up, with a few exceptions. People continued to dispose of secondary disaster waste in the streets, although this was far less common compared to the situation in October. Nevertheless, there is a need of a grappler in order to reach waste behind walls and in small lanes. As it is now, the front loader is frequently manually loaded because the machine cannot grip the waste.

The debris that spread into the salinas (salt lakes) has been cleaned up, with a few exceptions such as the pond to the west on the nether side of the new hospital.

At the hospital, proper waste disposal of common waste as well as infectious waste is re-established, with a functioning incinerator and proper storage facility. The temporary wooden construction for the oil tank has been replaced with a steel construction.

The power company, Turks and Caicos Utilities, announced in October their need of support regarding the collection of downed poles and in particular downed transformers. There was no international aid available for this task, but most of the electricity poles have been removed from the streets. However, many are remaining in yards and on other private property. Most poles were recovered by people informally after an announcement from the authorities. The Environmental Health Department arranged the collection of the transformers, and most of them have been secured now. In October it was estimated that 160

transformers had collapsed. In December the number of uncollected transformers was estimated to be around 15-20 (excluding empty transformer buckets left in different places). Most of the uncollected transformers were found on private property. A few are still left in the streets.

The South Base, where suspect roofing material was found in October, has been cleared of debris. Two damaged buildings remain, and at a private workshop in the northern part of the base, debris and equipment from the downed grid can still be seen.

The wires from the grid are slowly being coiled up on most places on the island. The wires are recovered and stored awaiting recycling. Cables used for telecom, internet and TV are still remaining in the streets, albeit often moved to the side. Cables are coiled up and collected only in some districts. A number of job opportunities could be provided in order to take care of the collection of wires and cables.

2.2 Sanitation

The sanitary conditions among all those who lost their homes during the hurricane are still problematical. The Environmental Health Department has put a lot of effort in empowering people to build pit latrines, but nonetheless many families lack proper sanitation. In some cases pit latrines have been constructed, but these are not dug deeply enough to be sustainable and the facilities do not provide acceptable hygienic conditions. The sanitation problems are closely connected to housing problems among the underprivileged population. The most vulnerable are those residing in rented X-ed houses⁵ or huts and are therefore unwilling to invest in reconstruction work that may be confiscated by the landowner and later rented out to someone else.

A six-month project, using the portable latrines available, is under implementation. The sludge will be collected with a vacuum tanker and transported to a treatment plant, which will be established in connection to the dump site. The plan is to use the stabilized sludge as a fertilizer and soil enhancement material in the immediate neighbourhood during the recovery of the site, which today is used as a scrap car yard.

The British Red Cross is launching a project aiming to improve the sanitary situation for the poorest, most often illegal immigrants from Haiti and Dominican Republic. The project, aiming to create work opportunities for poor women in the sanitary sector, is sanctioned by the Governor and the Environmental Health department. However, the sanitary situation highlights the interconnectedness with another challenge; these vulnerable groups have no sustainable housing situation.

2.3 Dump site condition and disaster waste treatment

Even before the storms impacted TCI, the dump site at Grand Turk had been poorly managed, as it was anticipated that the site would be closed and the waste moved to a new sanitary landfill on Providenciales. While awaiting the political decision, low priority was

⁵ The planning department has marked a large red "X" at illegally constructed houses and houses so damaged by the storms, they can not be repaired. The X-ed houses are to be pulled down as a safety and beautification measure.

given to the site on Grand Turk, resulting in a decisive lack of economic and administrative capacity to handle the current situation in the short term. However, the storms Hanna and Ike have demonstrated a need to maintain the dump site at Grand Turk. The daily amount of waste transported to the site in October 2008 was estimated to be 10-15 times the normal daily deliveries. The heavy load had, of course, a great impact on the dump site and required considerable additional efforts by the personnel as well as additional equipment. In addition to managing the disaster waste, a lot of engineering and improvement in management of the site will be needed to reach the standard necessary for facing a new tropical storm with heavy rains.

In December there was still more waste delivered than usually, but not to the extent that was experienced in October. The waste is estimated to be about two times the normal load.

Currently, disaster waste received at the dump site since the occurrence of Tropical Storm Hannah and Hurricane Ike is not stored separately from regular waste, and is consequently not treated appropriately. The main reason for this is the lack of appropriate equipment, like a grapple to pick out the trees and branches from the compactable waste. The trees and branches should be crushed or grinded into woodchips, which can be used as daily cover material at the dump. Even metal items, like roofing tins, should be picked out, stored separately, and later recycled.

When trees and branches are segregated from the rest of the waste, it will be possible to compact the waste and manage the dump site in a more controlled way. This might, in the long run, make the site more usable, even for other purposes than land-filling. In addition, the measures mentioned above will make more space available at the site. The compaction process also contributes to the stability of the site,⁶ and decreases the risk of fires by reducing the presence of air (oxygen).⁷

During the September/October mission, a need of assistance for compaction of the dump site was identified, including equipment for gripping the waste and training of the dozer operator in the technique of pushing and compaction. Furthermore, equipment for shredding the wooden waste will be needed.

During the follow-up mission meeting with the Governor, it was clarified that there were Caribbean Development Bank (CDB) funds available (USD 500,000) to cover extra collection costs related to the disaster waste management. These funds can be used to purchase the needed grapples.

A site for storage of scrap cars and some metal disaster waste has been informally established between the dump site and the public cemetery. Supposedly, a private company was contracted to clean up the site, but no activity was noticed during the three-week mission in September/October. During the follow-up in December, the management was changed and

⁶ Compacted waste is not as easily penetrated by rain water. In un-compacted waste, the degradation of biodegradable waste will lead to decreased stability in the dump, including causing holes and allowing for waste to shift, putting humans and machines at risk when working on the site.

⁷ Compaction decreases the air (oxygen) in the dump, which in turn reduces the likelihood of aerobic degradation. The aerobic degradation causes high temperatures in the site and quickly consumes the present oxygen, giving way to anaerobic degradation which leads to the development of landfill gas. This gas is explosive, but quite easy to collect and flare out. During the aerobic phase there is always a risk of fire on the site because of simultaneous local anaerobic conditions. The relatively small amounts of methane present during the aerobic phase may explode in the aerobic zones, which will cause a heavy polluting smoke.

a lot of activity was observed. The company will bring in more employees and new equipment in order to proceed in a faster and more efficient way. When the area is cleared of metal scrap, it will be restored, beautified, and later partly used for expansion of the public cemetery.

2.4. Gender and equity aspects of disaster waste

A disaster like Hurricane Ike affects everybody, rich and poor, men and women, children and adults, young and old. However, it affects the various groups to different degrees and in different ways.

At Grand Turk it is obvious that the most vulnerable people are also the most affected by the storms. The most underprivileged people lived in board houses and huts, and those houses were the ones most damaged by the storms. Many of them were destroyed and others were damaged to such an extent that it is impossible to restore them. Additionally, many of the remaining houses are X-ed in order to be demolished. Many people continue to live in tents distributed after Hurricane Ike that were intended only as a temporary solution. Many of the presently homeless population are labour immigrants from Haiti and Dominican Republic.

The clean-up has created some job opportunities, but the jobs were normally given to young and fit males. There are cases where women have applied for jobs, only to be told that the jobs are saved for the men and they (the women) should be content with unpaid jobs such as serving the men food.

Where the sanitary situation is particularly bad, women have to shoulder more of the responsibilities and burden than the men. Some interviewees identified single mothers as being the most vulnerable in terms of being adversely affected by the storms and even with regard to disaster waste management.

Nearly all interviews that were done researching gender aspects of the disaster waste management provided a more holistic perspective, indicating that the waste management problems were indicative of greater societal inequities. Everyone residing on the island was affected by the storms. They all suffered to varying degrees. Many homes were damaged, others were destroyed. Electrical supply was lost, telecommunications were down, and TV reception was not possible even in houses where generators provided temporary electricity. Disaster waste management was just one of many consequences of the storms, and for many not as important as the loss of other services such as electricity and water provision. Some interviewees highlighted the inequity persisting in society as a general problem, but they could not specifically pinpoint gender-related issues. Generally speaking, wealthy people were impacted less severely than the poor. Some areas saw their electricity restored, while others were still waiting for power. Both men and women suffered from the same problems.

The general waste management was functioning two days after Hurricane Ike, servicing homes with adequate waste collection and thus averting any sanitary problems. In those areas where the sanitation facilities were affected, the Environmental Health Department provided temporary portable latrines. Some people had no access to the latrines and defe-

cated in plastic bags, which were not properly disposed of. This contributed to the infestation of flies and subsequent hygiene concerns.

In the aftermath of the storms, many men lost work, which in turn affected the earnings of the entire family. Women were often tasked with a heavier workload. Disaster waste management provided some job opportunities for men, while women were excluded.

The British Red Cross was to implement a program among the most vulnerable communities aiming to increase job opportunities. The program would benefit the entire community (water, sanitation, clean up) as well as being open for all sectors of the community to participate in. The project would have a gender focus, offering job opportunities to women as well as men.

3 Conclusions

Disaster waste collection on South Caicos and Salt Cay is completed, and collection of residues from the destroyed power grid is under control. There is still a need to provide more resources and better equipment to ensure proper waste management on Grand Turk.

The Environmental Health Department at Grand Turk plays an important role in the preparedness for disaster waste management at Grand Turk. The department is also responsible for waste management on the island. It has deployed short-term personnel to collect hazardous waste (such as the transformers from the downed grid belonging to Turks and Caicos Utilities), to clean up at the South Base (where roofing material was found), and to clean up in the salinas.

3.1 Executed tasks

The immediate need for the collection and disposal of the transformers in the streets in order to minimize the impact of oil spillage on the ground has more or less been fulfilled.

There is still a need for equipment for gripping the waste that is due to be sorted at the dump site, as well as a need for equipment for shredding the wooden waste. After the meeting with the Governor and the heads of the Disaster Management Department, the Planning Department, and the Environmental Health Department, it appears the equipment can be purchased.

Recommended short-term measures:

- Regarding the collection of disaster waste on Grand Turk, a grapple should be used to lift debris from the streets, rather than continuing to use front-end loaders;
- At the dump site, all inert material has to be moved and compacted in the wet part of the site in order to build up stability so as to use the area for internal transport;
- To the extent that this has not yet been done, the dump site must be re-fenced and the gate must be replaced in order to keep bigger animals out of the site as well as to control when and how waste is delivered;
- In order to control storm water at the surface by diverting it away from the dump site (*none of the following steps have been taken*):
 - 1) The disaster waste already stored at the surface must be separated. Areas reserved for special waste like hazardous waste; waste electronic and electrical equipment (WEEE); and recyclable metal have to be established;
 - 2) Trees and branches should be separated from other waste materials and brought to a special area at the site for further processing (e.g. wood chip production);
 - 3) The remaining waste must be compacted properly to form a slope towards the East, where a new ditch must be established. This is an important first step to control rain and storm water;

- Staff must be further educated in order to be able to dispose of waste in an appropriate manner;
- There is no special need for assistance in recovering wires and cables from the downed power grid.

3.2 Recommended preparedness and long-term measures

These recommendations are similar to the ones provided in the first report.

- In the very short term the scrap car yard west of the dump site must be controlled, the metal recycled, and the site cleaned up;
- In the short term (1-2 months) the stagnant water in the dump site must be controlled, and the staff at the dump site needs education and better supervision;
- In the medium term (3-4 months) special areas must be prepared and reserved for different purposes; to ensure the separate storage of different types of waste, such as wooden waste, electricity poles, WEEE, hazardous waste, burial of asbestos waste and other special waste when needed and appropriate;
- In the medium term (6 months), there may be a need of support regarding the collection of electricity poles. This need does not seem to be significant today, but should be reassessed in the beginning of the year 2009;
- Before the next hurricane season, the dump site should be reconstructed with respect to water control, compaction of waste and developing/forming the surface, and designation of areas dedicated for special waste (like electricity poles and hazardous waste). A plan for development of the dump site has been presented to the Environmental Health Department. The mobilization of resources for preparedness and mitigation should be carried out by the TCI administration.

For a report on more general improvement of the site, see the report from the September/October mission (available at <http://ochaonline.un.org/ochaunep>)



The **Joint UNEP/OCHA Environment Unit**, integrated into the Emergency Services Branch of the Office for the Coordination of Humanitarian Affairs, is the United Nations mechanism to mobilize and coordinate the international response to environmental emergencies. The Joint Environment Unit works with affected countries to identify and mitigate acute negative impacts stemming from emergencies, providing independent, impartial advice and practical solutions. It also works with organizations dedicated to medium and long-term rehabilitation to ensure a seamless transition to the disaster recovery process.

The Joint Unit's key functions include:

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Arrange for the urgent dispatch of international experts to conduct impartial and independent assessment of the environmental impacts of an emergency.