

Environmental Issues Fact Sheet

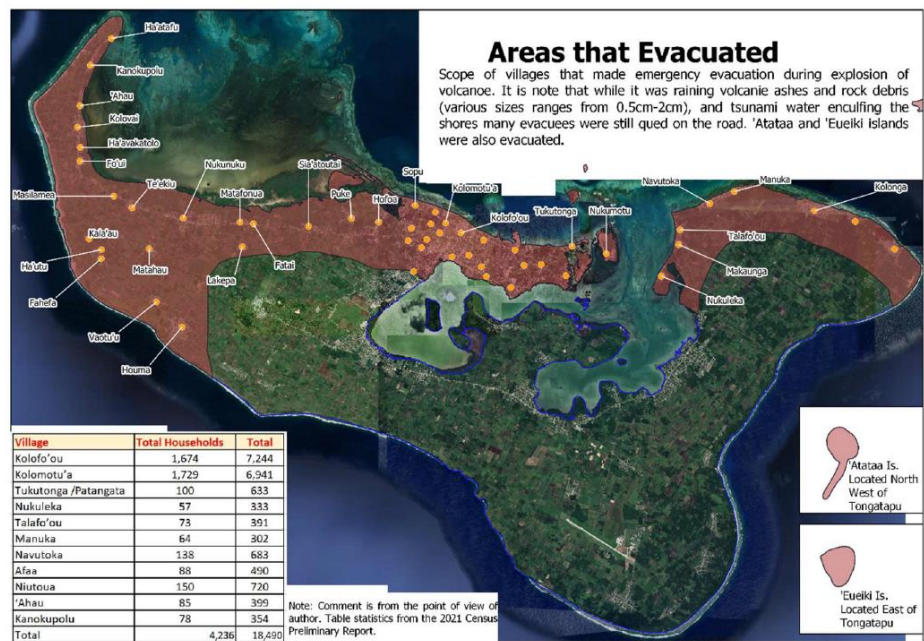
Tonga Volcanic Eruption and Tsunami

31 January 2022

Overview

The Kingdom of Tonga was hit by the combination of volcanic eruptions and ash from the Hunga Tonga-Hunga Ha'apai volcano and a volcano-generated tsunami. The eruptions caused ash falls on several inhabited islands, including the main island Tongatapu (70% of the population). Ash falls occurred before and after the 15 January 2022 eruption, which triggered a tsunami. The tsunami led to damage to buildings, and other parts of the built environment, vehicles, building contents, as well as damage to vegetation, beaches and the near-shore natural environment.

The map at right indicates reported evacuation areas as a result of the tsunami. The commercial center of Tonga is located in the upper middle of the map.¹



Produced by: Interational Office of Migration Tonga (Data from Tonga Statistics Department, 2021 Census, Preliminary Report)

Ash falls do not appear to be deep (e.g., leading to building collapse), but have coated buildings, the ground and vegetation. Rainwater is a major source of domestic water supplies in Tonga. Household collection now contain significant quantities of ash, leading to issues with water safety. When wet, the volcanic ash can turn acidic, affecting vegetation.

Government led damage assessments are underway. Initial estimates are that almost the whole population of the Kingdom (100,200 persons) has been affected by the ash falls and 88% by the tsunami.²

¹ Map source: [Hunga Tonga-Hunga Ha'apai Volcanic Eruption Sitrep 10](#), National Emergency Operations Centre, Kingdom of Tonga.

² [Hunga Tonga-Hunga Ha'apai Volcanic Eruption Sitrep 10](#), National Emergency Operations Centre, Kingdom of Tonga.

Tonga is in the November to April typhoon season and has been affected by two typhoons during the past four years. Forecasts indicate “above normal rainfall over the majority of Tonga during this Tropical Cyclone Season with increased risk of heavy rain events” for the 2021-2022 typhoon season.³

Tonga has considerable experience in recovering from disasters. However, the recent disasters and the impact of COVID restrictions on tourism (20% of GDP)⁴ create a different disaster recovery reality for the Kingdom. Recovery from this disaster includes limitations on foreign technical and materials assistance for the current disaster and self-driven recovery.

This **Environmental Issues Fact Sheet** provides initial information and guidance on managing key environmental aspects of relief and recovery efforts in Tonga. The **Fact Sheet** is based on a review of disaster damage information from Tonga, past disasters (e.g. see [this resource](#)), assessments of post-disaster environmental issues in other islands states (e.g. Saint Vincent – see [this resource](#)), and other disasters (e.g. the South Asia Tsunami. Due to communications disruptions, this **Fact Sheet** was developed remotely with limited opportunity for inputs from personnel in Tonga. As such, the **Fact Sheet** should be taken as a ‘best possible’ effort and subject to revision as more details are available.

Key Environmental Issues Debris Management⁵

The tsunami is likely to have generated considerable disaster debris. Volcanic ash is likely to have damaged vegetation, also generating debris. Ash itself may be considered as disaster-related debris.

The main island of Tongatapu is reported to have a single landfill. Similar facilities are not likely to be present in other islands. As a small island state, Tonga has limited land space for debris disposal while the level of debris to be disposed after the tsunami and ash falls is likely to be significantly more than normal disposal requirements.

As a result, it is recommended that the Kingdom pursue a debris management strategy which focuses on repurposing, reusing, and recycling to reduce quantities which need to be disposed or transported off the islands. Debris management that includes

Asbestos

Tonga has been identified as at high risk for significant release of asbestos fibers, if disturbed, and significant health risk to occupants of affected buildings. According to the *Survey of the Regional Distribution and Status of Asbestos-Contaminated Construction Material and Best Practice Options for its Management in Pacific Island Countries Report* prepared for SPREP (Secretariat of the Pacific Regional Environment Programme), Tonga had 2,550 m² of asbestos containing materials circa 2015. In 2014, it's estimated that Cyclone Ian generated more than 300 tons of disaster debris, including asbestos waste.

(Adapted from Debris Management Considerations Cyclone Gita, Tonga 21 February 2018, Environment & Disaster Management, Green Recovery Connect, WWF US. <https://envirodm.org/post/debris-management-considerations-cyclone-gita-tonga>).

³ See <https://reliefweb.int/report/tonga/2021-2022-tropical-cyclone-season-outlook-tonga-ento>.

⁴ Source: <https://knoema.com/atlas/Tonga/topics/Tourism/Travel-and-Tourism-Total-Contribution-to-GDP/Contribution-of-travel-and-tourism-to-GDP-percent-of-GDP>

⁵ Adapted from <https://envirodm.org/post/debris-management-considerations-cyclone-gita-tonga>.

repurposing, reusing, and recycling will also reduce the quantities of relief and recovery aid which need to be shipped into the islands, reducing the environmental footprint and speeding recovery by reducing delays due to procurement and shipment.

Options to consider include:

- The reuse of building materials found in disaster debris for fencing, furniture, rebuilding (if materials meet standards) and processing into items for sale.
- Reuse of tires and other debris for tables, plant containers, swings for children and other playground equipment.
- Deconstructing vehicles and damaged mechanical equipment and processing materials for scrap off-the-islands.
- Composting vegetative matter for use in gardens and to support revegetation in tsunami-affected areas.⁶

Given the scope of assistance involving plastic water bottles, the debris management plan should include specifics covering the collection and processing of plastic bottles.

The burning of disaster debris should be avoided. Limited quantities of dry vegetative matter can be used for cooking, but burning any materials which have been treated, painted or otherwise processed should be avoided due to the health and air pollution risks.

General guidance on debris management is available from the following sources:

- [Emergency Shelter Cluster Quick Guide Post-Disaster Debris Management](#)
- [Disaster Waste Management \(DWM\) Guidelines](#)

[Tonga-specific debris management guidance is available from Debris Management Cash for Work - Review Report Ha'apai-Tonga April -June 2014 \(UNDP\)](#)

Water and Sanitation

Relief Aid Packaging Return to Sender

Relief aid packaging should be proactively managed. Where possible, packaging should be reused, repurposed or recycled to support relief and recovery efforts.

At the same time, items like plastic water bottles and plastic wrapping should be collected and returned to the countries which sent the aid. This effort is particularly important for islands that lack any landfill options.

The “Return to Sender” approach is an emerging trend in humanitarian assistance, and has been raised as an operational modality in the neighboring state of Vanuatu. For more information see [this webpage](#).

Note that there is a levy on the importation of plastic bags (see https://ago.gov.to/cms/images/LEGISLATION/SUBORDINATE/2013/2013-0023/WasteManagementPlasticLevyRegulations2013_2.pdf).

⁶ Any salt on vegetative matter will be removed through composting and exposure to rains.

Tonga's heavy reliance on rainwater for domestic use makes ash contamination a significant issue. While current ash deposits can be cleared from rainwater collection and storage, recovery assistance should include mechanisms to reduce future ash contamination given the historic likelihood of volcanic eruptions.

Groundwater is also a significant source of water for domestic use. Care should be taken to avoid overpumping freshwater lenses that have been contaminated with salty or brackish water from the tsunami. Refer to local experts and consult **Cleaning Wells After Seawater Flooding**⁷ on clearing salt or brackish water from wells. Additional information on tsunami-affected wells can be found in **Tsunami Impacts and Rehabilitation of Groundwater Supply: Lessons Learned from Eastern Sri Lanka**.⁸

Tonga is reported to be reliant on septic tanks and latrines to manage liquid waste. The tsunami may have filled many tanks and wells with saltwater. The effluent should be pumped and disposed in designated ponds to avoid ground water and near-shore pollution. Care should be taken that the operating capacity of disposal ponds is not exceeded by the increase in effluent being disposed from tanks and latrines filled with water from the tsunami.

Cash and Direct Assistance

Tonga's level of development and the range of expected needs make the provision of cash assistance (as direct assistance or through cash for work) a feasible element of the disaster recovery process. The provision of cash, however, needs to be based on market assessments (including supply chain constraints) to ensure an increase in financial liquidity does not lead to price inflation, shortages, and recourse to natural resources to cover immediate needs. Use of the [Emergency Market Mapping and Analysis Toolkit](#) together with a review of possible environmental impacts is recommended before any large-scale cash transfers take place.

Caution is also needed to ensure cash transfers or direct provision of assistance does not contribute to an overexploitation of marine and coastal resources. In general, the repair or provision of fishing boats or fishing equipment should not lead to a greater capacity to harvest marine resources than existed before the disaster, and should be based on an understanding of the fisheries management and better management practices (see [green fisheries recovery guidelines](#)).

Diaspora Relief Aid

Tonga has a considerable diaspora, which is providing assistance to those impacted by the disaster. Based on the aftermath of similar disasters, donations of goods, including clothing, drugs and household items, often exceed actual relief requirements and

⁷ WHO, 2013, https://cdn.who.int/media/docs/default-source/wash-documents/who-tn-15-cleaning-wells-after-seawater-flooding.pdf?sfvrsn=83714e53_4

⁸ Tsunami Impacts and Rehabilitation of Groundwater Supply: Lessons Learned from Eastern Sri Lanka (2010). Villholth, Karen & Jeyakumar, Paramsothy & Amerasinghe, Priyanie & Manamperi, Sanjeeva & Vithanage, Meththika & Goswami, Rohit R & Panabokke, Chris. Natural and Anthropogenic Disasters. 10.1007/978-90-481-2498-5_5.

become logistical and disposal problems. With a few exceptions, it is likely more effective to provide financial support to the disaster-affected, either directly or through charities with established connections in the Kingdom.

Moving to a Green Recovery

Although the impact of the volcanic eruption, ash fall and tsunami have been significant, reports indicate that most immediate life saving needs have been met. Given Tonga's experience with recent disasters, it is likely that recovery plans are already in development.

Based on other small island state experiences, these plans should include:

- Rebuilding coastal zones to consider potential coastal flooding, sea level rise and typhoon effects. The coastal zone should be restored and managed to contribute to future disaster risk reduction and serve as an environment-based protection for the islands against natural hazards.
- Upgrading water and sanitation systems, at all scales, to better manage the impacts of ash, typhoons and drought. These efforts should consider measures to improve groundwater quality and introduce better liquid waste management on all inhabited islands.
- Risk reduction and resiliency from typhoons, tsunamis, drought and volcanic ash in infrastructure and livelihoods recovery reduce energy use per capita and shift away from hydrocarbon energy in rebuilding and repairing buildings and physical infrastructure, particularly in the central commercial areas of Tongatapu.
- A Strategic Environmental Impact Assessment to better understand the large scale impacts and opportunities from recovery and identify pathways to improve the use of natural resources across the islands.

Tonga-Specific Environmental Guidance

Waste Management Act (Revised 2016)

https://ago.gov.to/cms/images/LEGISLATION/PRINCIPAL/2005/2005-0011/WasteManagementAct_2.pdf

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Waste Management (Plastic Levy) Regulation (Revised 2016)

https://ago.gov.to/cms/images/LEGISLATION/SUBORDINATE/2013/2013-0023/WasteManagementPlasticLevyRegulations2013_2.pdf

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Hazardous Wastes and Chemicals Act (Revised 2016)

https://ago.gov.to/cms/images/LEGISLATION/PRINCIPAL/2010/2010-0028/HazardousWastesandChemicalsAct_2.pdf

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Environment Management (Litter and Waste Control) Regulations 2016

https://ago.gov.to/cms/images/LEGISLATION/SUBORDINATE/2016/2016-0003/EnvironmentManagementLitterandWasteControlRegulations2016_1.pdf

- Environment Management Act (Revised 2016)

https://ago.gov.to/cms/images/LEGISLATION/PRINCIPAL/2005/2005-0011/WasteManagementAct_2.pdf

- Environmental Impact Assessment Act of 2003

<http://extwprlegs1.fao.org/docs/pdf/ton49306.pdf>

- Renewable Energy Act 2008

<https://www.pcreee.org/publication/renewable-energy-act-2008-tonga>

- [Emergency Shelter Cluster Quick Guide Post-Disaster Debris Management](https://www.alnap.org/help-library/quick-guide-post-disaster-debris-management)

<https://www.alnap.org/help-library/quick-guide-post-disaster-debris-management>

- Asbestos in Emergencies: Safer Handling and Breaking the Cycle

<https://www.alnap.org/help-library/asbestos-in-emergencies-safer-handling-and-breaking-the-cycle>.

- Disaster Waste Management Guidelines (UNEP)

<https://ecentre.org/resources/dwm/>

- Guidance Note on Debris Management (UNDP) Guidance Note on Debris Management (UNDP)

<https://www.undp.org/content/dam/undp/library/crisis%20prevention/SignatureProductGuidanceNoteDebrisManagement11012013v1.pdf>

- [Building Material Selection and Use Building Material Selection and Use --An Environmental Guide \(An Environmental Guide \(BMEG \)](#)

- Green Recovery & Reconstruction: Training Toolkit for Humanitarian Aid (Green Recovery & Reconstruction: Training Toolkit for Humanitarian Aid (GRRT)

<http://envirodm.org/green--recovery>