



Loss of Tonga's telecommunication:

What happened, what were the consequences and how were they managed?

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BRIEF SUMMARY

Cause: underwater volcanic eruption with subsequent tsunami waves and underwater landslides.

Duration: five weeks and three days.

Immediate consequences: demanding to map the situation, coordinate emergency aid and establish contact outside Tonga, but also between all the country's islands.

Long-term consequences: weakened economy because of a halt in important transactions from Tonga's diaspora abroad. Especially demanding for women, who often depend on such payments. Weakened internet connection within the country for an indefinite period.

What happened?

In January 2022 the subsea volcano Hunga Tonga-Hunga Ha'apai in Tonga had a major eruption which also cut the country's communication lines nationally, between Tonga's inhabited islands and the outside world. The damage led to a complete halt in international communication (a "digital darkness") which meant that, in the period immediately after the outbreak, not much was known about the extent of the damage in Tonga. Due to very limited access to contact with both the authorities and the population of Tonga, it was only during overflights carried out by the Australian and New Zealand air forces that one could begin to map the extent of the damage and the need for assistance.

The loss of digital communication lasted for five weeks and three days, and represents a unique natural experiment for how loss of data flows affects a society. The ways in which this situation was handled, and the services that were built, contain valuable lessons about digital vulnerabilities in the Global South, and how these can be accommodated.

The cable and crisis preparedness

Tonga is one of the most digitalized countries in the South Pacific.¹ The international submarine cable connecting Tonga with the Internet was ordered in 2013, and the cable connecting its inhabited islands was ordered in 2018.² In 2019 more than half of Tonga's 110 000 citizens were connected with individual Internet subscriptions, mainly via cell phones.³ Although the country's digital infrastructure is vulnerable it was still, however, somewhat prepared for natural disasters. One example of this is the country's national data center, which has been located in a transportable sea container that could be moved to a safe place in the event of an emergency.⁴ Furthermore, less than one year before the eruption, Tonga held a multi-hazard disaster risk assessment of the main island of Tongatapu. This assessment was shared with bilateral, regional and multilateral organizations assisting Tonga after the eruption.⁵ The preparedness also evolved around cable connectivity: the government proposed a more cost-effective cable backup solution in January. However, the suggestion received fragile support as many Tongans thought that a natural disaster most likely would damage both cables either way.⁶

The Pacific is known among investors in the cable industry for its "thin routes" - an expression to describe the marginal profit that private companies envisage by investing in construction of the cable network in the Pacific. This means that the possibilities for (extended) connectivity for the countries in the region are at the mercy of catching the interest of investors, development institutions and aid programs from the outside⁷ - another example of the vulnerability of connectivity for Pacific island states.

After experiencing a black out in 2019, the Tongan government entered into a long-term contract with the satellite operator Kacific. This was supposed to work as a national backup and provide satellite broadband to institutions and critical infrastructure such as hospitals and schools in more than 80 of the remote islands. However, the deal was never finalized because of financial disagreements between Tonga and Kacific.⁸ Tonga has also worked with the World Bank on developing the government's digital capabilities on cybersecurity since 2019.

The reparations

After the eruption, the operator Digicel was able to reconnect via satellite, but the connection was slow. Digicel also worked with other operators such as Intelsat, Spark, and Optus to be able to provide satellite connection,⁹ and the people of Tonga had to settle for temporary satellite services while they waited for the cable repair. These satellite companies were, however, not able to replace more than 12.5% of the national need, making the incident one of the most serious cases we know of where an entire community has been cut off from the digital infrastructure and the internet.

Repairing the cable was cumbersome, demanding and took a very long time. The vessel CS Reliance was tasked with replacing the 92 kilometer fraction of the 827 kilometer long international submarine cable connecting Tonga to the networks in Fiji and elsewhere. It spent in total 20 days on the operation.¹⁰ Before it could begin its work on

repairing the cable, it had to go from Papua New Guinea to Samoa to collect necessary materials. Telecommunications companies from other Pacific Islands, particularly New Caledonia, supplied extra lengths of cable when Tonga itself did not have more at its disposal.

The next step was repairing the national cable that runs between the main island of Tongatapu and other, more remote islands that had been struck even worse by the tsunami waves. A total of 110 kilometres of the cable would have to be replaced, and it was estimated by a Tonga Cable official that this could take six to twelve months.¹¹ One of the main challenges of the reparations was the lack of available cable. Tonga Cable nevertheless stated that communication using temporary satellite connection to remote islands would improve once the networks on the main island could be switched back from satellite to fibre. The process spurred one of the two main service providers to state in a press release that the company would investigate opportunities for increased investment in network optimization in the future to be better prepared for disasters.¹²

Mitigation: What, how and whom?

In the weeks and months after the disaster, citizens of Tonga were frustrated by the authorities' delayed response and lack of a backup in the event that the cable should fail again. In the weeks following the damage to the cable, Tonga was dependent on international aid from the outside. Despite the disagreements with satellite provider Kacific, this company was one of the first to support the Tongan government by providing back-up networks to the country. In addition, other countries such as the United States and Luxembourg also contributed through their own providers.¹³

Other efforts were also made by outside actors. For example, regional and global partners of the ETC (Emergency Telecommunications Cluster) responded quickly, and on several occasions, WFP in Fiji delivered satellite phones. The International Telecommunication Union (ITU) supplied a further six, and Iridium offered free call time. Additionally, three portable satellite network devices, also known as broadband global area networks (BGANs), reached Tonga in a few days. Télécoms Sans Frontières (TSF) provided these terminals with free data. Luxembourg sent two high-capacity satellite dishes (VSATs) to work on connecting the government and communities on Vava'u and Ha'apai damaged by the disaster.¹⁴

Consequences

Underwater cables are vulnerable everywhere, but the Pacific island states are particularly vulnerable because most of them are only connected via one single cable.¹⁵

The Tonga volcanic eruption revealed vulnerabilities in the global telecommunications system and it was very difficult for government officials and agencies and the emergency services to communicate with each other. In addition, it was demanding for local communities to identify and coordinate emergency aid, assistance and other needs.

The lack of a stable network prevented the coordination of aid and relief work, and made it almost impossible to

update family and friends outside the island state. This is essential to mention because the Tongan diaspora – although it is difficult to find exact figures – is larger than the population residing in Tonga itself. Small island states have always been particularly exposed to natural disasters, and now also increasingly as a result of climate change. This incident is a reminder of the urgency of assessing and putting in place a national telecommunications emergency plan that takes account of the special needs of these small island states.¹⁶

The network disruption had major ripple effects on Tonga's economy. In Tonga, roughly 30% of household consumption and 40% of GDP depend on internet-transferred remittances from the Tongan diaspora: friends and relatives. This also affected gender bias, as women in Tonga are very dependent on such remittances in dealing with increased prices for food and water in times of crisis. In a highly interconnected world, the prospect of not being able to use the internet becomes a vulnerability when crises such as the volcanic eruption hit. Other Pacific island states such as Samoa and Vanuatu also rely on a single cable, and satellite services are limited and not spread out well enough to meet basic needs and demand.¹⁷

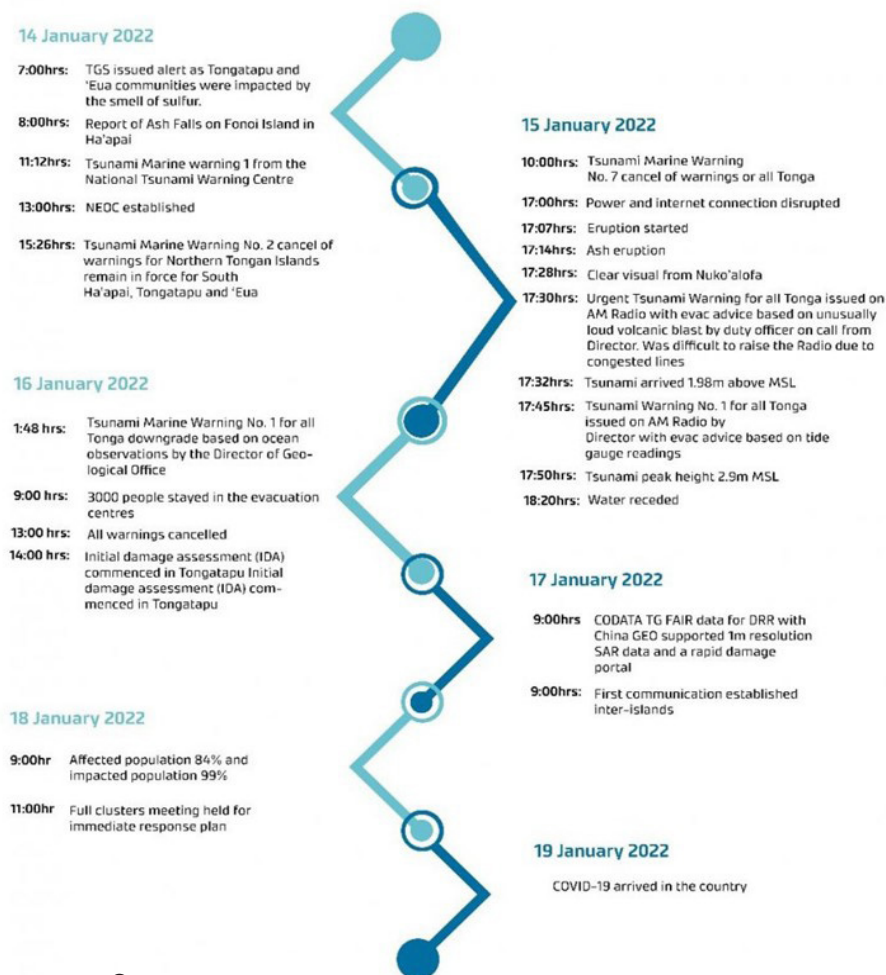
Although it was initially estimated that the domestic cable would be repaired before 30 September 2022, the new date for completion of the cable is 30 April 2023.¹⁸

Implications and lessons

First and foremost, the disconnection of the sole Tongan submarine cable and the limited ability of satellite connections to replace the shortfall highlight the vulnerability of developing island states when it comes to digital connectivity. The thin margins for companies operating in the region, and the resulting underinvestments in digital infrastructure, puts states like Tonga in a precarious position as they embrace the benefits of digitalization. This is exacerbated by the vast distances, and the lack of sufficient equipment and crew for repairs. Such a “digital divide” between developed and developing countries has already been a staple in debates over digital technologies for decades, but nevertheless continues to be a significant issue.

The lack of resilience is made all the more significant as digital connectivity offers much-needed sources of income and opportunities. For Tonga, the importance of remittances facilitated by digital technologies underlines how digitalization offers economic opportunities and improvements. Resultingly, enhancing digital resilience becomes a question with society-wide implications.

Timeline of Tonga-Hunga-Ha'apai Eruption and Tsunami Responses



Source:

<https://www.preventionweb.net/news/strength-ening-emergency-communications-complex-cas-cading-and-compounding-events-lessons>

Endnotes

¹ 16.02.2022: What the Tonga disaster tell sus about the South Pacific's cyber resilience (A. Hogeveen, PreventionWeb)

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ How Tonga prepared for and responded to a devastating volcanic eruption (A. Galperin, Asian Development Bank, 28.03.2022)

⁶ Four months offline: post-quake, many Tongans are still without internet (Rest of World.org): <https://restofworld.org/2022/tonga-earthquake-internet-reconnection-update/>

⁷ Ibid.

⁸ What the Tonga disaster tells us about the South Pacific's cyber resilience (PreventionWeb): <https://www.aspistrategist.org.au/what-the-tonga-disaster-tells-us-about-the-south-pacifics-cyber-resilience/>

⁹ Tonga's volcanic eruption & lessons for internet connectivity in small island states (World Wide Web Foundation): <https://webfoundation.org/2022/02/tongas-volcanic-eruption-lessons-for-internet-connectivity-in-small-island-states/>

¹⁰ Tonga's internet access restored a month after volcanic eruption cut communications to remote island (CBC): <https://www.cbc.ca/news/world/tonga-reconnects-internet-after-volcano-eruption-1.6360520>

¹¹ Ibid.

¹² Ibid.

¹³ Four months offline: post-quake, many Tongans are still without internet (Rest of World.org): <https://restofworld.org/2022/tonga-earthquake-internet-reconnection-update/>

¹⁴ Tonga recovers its voice in the wake of deadly volcanic eruption (ReliefWeb): <https://www.preventionweb.net/news/tonga-recovers-its-voice-wake-deadly-volcanic-eruption>

¹⁵ See Watson & Malungahu (2022) for an overview of current and planned Pacific Islands cables (PICs), as well as a good vulnerability analysis of these cables/countries.: <https://www.internationalaffairs.org.au/australianoutlook/island-kingdoms-communication-cable-repaired/>

¹⁶ Tonga's volcanic eruption & lessons for internet connectivity in small island states (World Wide Web Foundation): <https://webfoundation.org/2022/02/tongas-volcanic-eruption-lessons-for-internet-connectivity-in-small-island-states/>

¹⁷ [Tonga volcano eruption - Interconnected Disaster Risks \(interconnectedrisks.org\)](https://interconnectedrisks.org/disasters/tonga-volcano-eruption): <https://interconnectedrisks.org/disasters/tonga-volcano-eruption>

¹⁸ Tonga: Hunga Tonga-Hunga Ha'apai Volcano, Situation Report #12 (Emergency Telecommunications Cluster (ETC), reporting period 26 August – 30 September): <https://reliefweb.int/report/tonga/tonga-hunga-tonga-hunga-haapai-volcano-etc-situation-report-12-reporting-period-26-august-30-september-2022>

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