Tweeting Tsunami: Influence and Early Warning in British Columbia

Amanda Oldring[1], Alexander Brand[2], Antonina Milekhina[3]

Organza[1], University of Bamberg[2], Laboratory for Applied Network Research, NRU-HSE[3]

Objective

Early warning has been studied on Twitter, but Canadian research is exceptionally rare. Especially British Columbia (BC) is vulnerable to tsunamis, and warning systems are not ubiquitous. Establishing pre-event networks can contribute to understanding early warning dissemination potentials in BC particularly because coastal communities exposed to the open ocean are amongst BC's most vulnerable to tsunami risk. Rural communities without dedicated warning infrastructure are even more so. To understand established communication network structures we analyze a 1,932 follower network for NWS_NTWC, the region's source tsunami warning account.

Methods

We use profile content analysis to identify stakeholders and social network analysis to describe connections by role, country, and community type (rural or urban). In February 11, 2014, a network consisting of 9,998 NWS_NTWC Twitter followers (nodes) and 70,054 relationships between them (edges) was collected, which refers to 86% of the total follower network. Content analysis was conducted to locate CSN accounts and define their disaster mitigation stakeholder groups. All public accounts in English were assessed. Units of analysis were profile bios, locations, and URLs, and, if profile data was insufficient, up to fifty most recent tweets. Stakeholder groups were post-coded as per Bailey and Hackett's [4] recommendations for changeable term sets with the categories Academia, Citizen, First Responder, Government, Hobbyist, Media, Private Sector, Professional and Public Sector. Three metrics were accessed to study stakeholder groups' internal communication capacity: Reciprocated Node Pair Ratio, Connected Components and Density. After this, CSN Opinion Leaders (n = 491) were invited to participate in an online survey about Twitter use, location and self reported influence. Of these, 167 people replied and 120 completed the survey. The survey data used in this study pertained to verifying network assigned stakeholder locations and influence values.

Results

Within the CSN, Figure 1 shows that most followers are citizens or professionals. Private sector and media are the next largest groups, with government as fifth. Public sector, hobbyist, first response, and academia make up the tail. Node distributions vary across BC and the US. BC has more citizen, first response, private sector, and professional users, and fewer media users than the US. In rural communities, first response, hobbyist, and private sector groups had the most representation out of all the groups. Municipalities were assigned coordinates and mapped with ArcGIS (Figure 2). The map shows most users live along coastlines and are concentrated in urban hubs and communities: the Greater Vancouver and Victoria areas (BC), Seattle (WA), Portland (OR), and San Francisco or Los Angeles (CA). Alaskan users were more dispersed.

BC's coasts are split into five tsunami notification zones. Zone A covers North Coast and Haida Gwaii. Zone B covers the Central Coast and Northern Vancouver Island. Zone C covers Vancouver Island's outer West Coast and Zone D its Southern Coast. Zone E covers the Strait of Georgia. Zones A to C contain the most isolated communities with limited warning infrastructure [2]. Most of BC's rural users are in the highest risk Zones A to C. The data verifies the CSN can access at least some last mile communities, but rural representation is still severely low, particularly in Zone B. Given that BC has greater citizen, professional, and private sector representation, it can be argued that this region in the CSN is more structured for mutual distribution of information or seeking along network paths compared to the US. Furthermore, given that 70% of rural users are in BC, the high proportions of first responder and hobbyist stakeholders in rural communities is important. The data suggests that rural communities have distinct network structures within the CSN that are more conducive to boosting and brokering than the rest of the province.

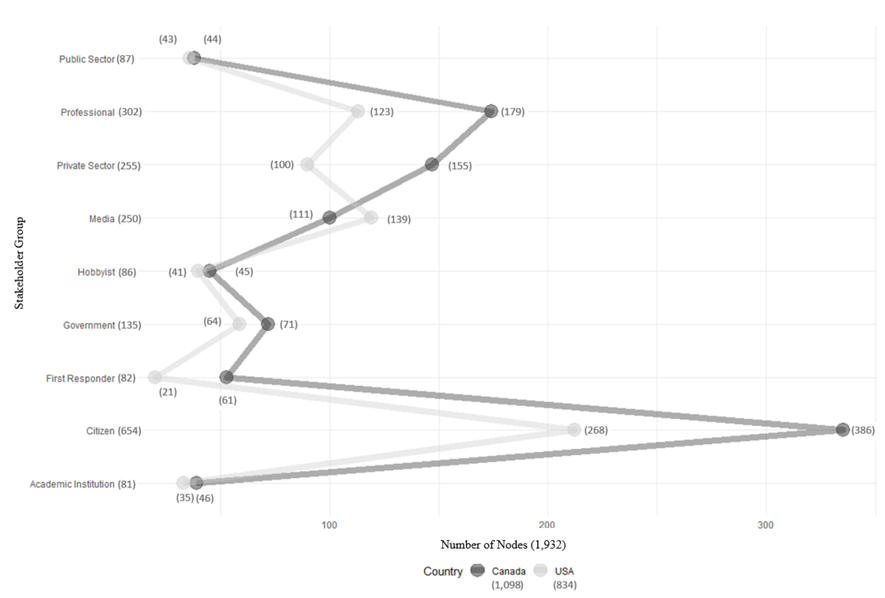

Figure 1:Distribution of Nodes between Stakeholder Groups

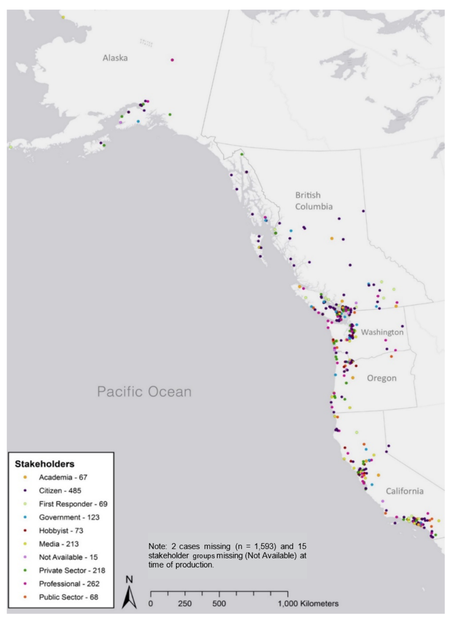

Figure 2:Spatial Distribution of Nodes

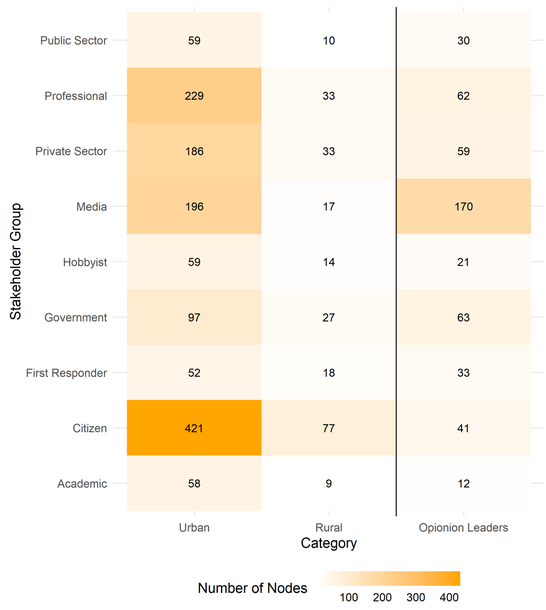

Figure 3:Urbanisation and Opinion Leaders

Contact Information

- a.oldring@gmail.com
- alexander.brand@uni-bamberg.de
- antonina.milehina@yandex.ru

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