27 (2026) 100616

Contents lists available at ScienceDirect

The Journal of Climate Change and Health

journal homepage: www.elsevier.com/locate/joclim

Perspective

Beyond rural: A time-based measure for urban, rural, remote, and geographically isolated response

Daryl Schaffer [*], Alec Bennett [1]

Center for Arctic Security and Resilience, University of Alaska Fairbanks, Alaska, USA

ARTICLE INFO

Keywords:
Climate change
Rural
Remote
Geographically isolated
Disaster response
Island

ABSTRACT

In disaster doctrine, urban and rural definitions are typically based on population size and distance (kilometers or miles) from urban, road-accessible locations. Associated guidelines and assumptions are challenging to apply for islands and off-the-road locations. Disaster response models have become stagnant despite advances in transportation modes and climate change adaptations. With no consistent definition of rural, a gap exists on what is considered remote and the reality of being geographically isolated. Proposed here are time-based guidelines on four geographic settings correlated to the arrival of the initial disaster emergency response at a location deemed "urban" as under 10 minutes, "rural" under an hour, "remote" under 24 hours, and "geographically isolated" over 24 hours.

1. Introduction

In disaster response, the quicker that response assets - people and equipment - can arrive, the greater the potential to save lives. Two separate phases follow disasters: *recovery* helps a community return to normal; *response,* the focus of this Perspective, involves immediate life-saving efforts.

Urban areas often have abundant people and equipment to address disasters. If events overwhelm local capabilities, additional resources typically arrive quickly. Rural areas tend to have fewer response resources, are easily overwhelmed during disasters, and additional resources take more time to arrive from further distances. A dichotomous urban-rural delineation fails to capture the challenges of locations that require significant time - hours or days - to reach initially after a disaster. Many Small Island Developing States (SIDS) face increasingly difficult changing climatic conditions. Indigenous lands face unique cultural challenges as more powerful cyclones retain strength at higher latitudes. In lieu of a bifurcated urban-rural designation based on distance or population, we propose time-based parameters and two additional designations for planning initial disaster response in urban, rural, remote, and geographically isolated locations.

2. Historical urban-rural definitions

Socio-economic, geophysical, anthropological, climate, humanity, and disaster studies use a simplified location-based bifurcation of population: Urban or Rural. The United Nations (UN) uses urban-rural for aggregation of vital statistics, yet notes “it is not possible or desirable to adopt uniform criteria to distinguish urban areas from rural areas” [1]. The UN relies on member country definitions which include population, density, availability of resources, and other variables [2,3]. Urban population minimum thresholds vary from 200 people in Denmark to 100,000 in China with most nations using 5,000 [4–6]. The UN Statistical Commission supports a “Degree of Urbanisation as a method to delineate cities and urban and rural areas” for comparisons [4,7]. This per square kilometer computation of population density, dwellings, and building development more accurately designates urban areas, but leaves everything else as rural. Euphemistic subcategories - city, town, hamlet, metropolitan, suburban, exurb, etc. - retain the same basic bifurcated definition: "urban" is any urbanized area; "rural" is everything else.

The UN Sendai Framework, a worldwide disaster response and recovery guidance agreement, did not define urban-rural while a separate UN report stated “SIDS are some of the world’s most disaster-prone countries” and also highly vulnerable due to their “small size, remoteness, spatial isolation, and dependence on trade” [8]. Emergency

* Corresponding author.
E-mail address: dschaffer2@alaska.edu (D. Schaffer).
[1] Co-Author.

https://doi.org/10.1016/j.joclim.2025.100616
Received 1 April 2025; Accepted 4 November 2025
Available online 23 December 2025

response planning identifies needs, capabilities, and logistics via land, air, or water under an urban-based "one-size-fits-all" assumption. If planners could predict where an incident would occur, placement of response assets could be determined by physical distance, but catastrophic disasters can overwhelm local resources regardless of location.

To define rural locations, some studies use travel times of 60 minutes to the edge or center of an urban area [1,2]. The US Department of Agriculture used “low population and high geographic remoteness” to create a Frontier and Remote (FAR) list “defined in relation to the time it takes to travel by car to the edges of nearby Urban Areas” to obtain higher-order emergency care services. Gradients up to 60 minutes, correlated to population, distinguished levels of rural while areas in excess of 60 minutes were considered frontier and remote [5]. Travel time has been used to separate urban-rural, but not to distinguish locations over 60 minutes.

3. Time vs distance

Consideration of a temporal versus spatial measure in disasters has two benefits: 1) automatic accounting for delays in traffic, road blockage, detours, and weather conditions; 2) preemptively considering alternate technologies that could accelerate transport speed. This type of response time planning is already employed in the Philippines archipelagos in localized emergency calls [9]; however, in 2023 when Typhoon Mawar struck, 9 seaports, 56 roads, and 4 bridges were damaged, overwhelming responders’ time-based response capabilities [10].

Incident response time - the interval between receipt of basic emergency calls to arrival of assets - has been reviewed for different world regions. A limited-scope study in one US urban area found a median of seven (7) minutes for urban response and over 14 minutes for rural locations, with respective 90th percentiles of 12 and 26 minutes [11]. A Peruvian study on travel times used an indicator developed by the European Commission, incorporating river, road, rail, and land contour, which estimated the travel time from a point to a city of 50,000 people ranged from 0 to 4,099 minutes (over 68 hours) with a mean under 8 hours [12]. Emergency response in the Canadian Arctic ranged from 13 to 237 hours for high northern latitudes [13]. These time-based basic emergency measures can be applied to disaster response.

For urban areas, the existing standard is a 9-minute average expected response time for complex incidents akin to disasters; single car accidents or house fires have shorter time standards. This was based on standards and formulas from the International Association of Fire Fighters, US National Fire Protection Association and National Volunteer Fire Council, United Kingdom, International Organization for Standardization, and US Department of Labor Occupational Safety and Health Administration [14,15]. By these criteria, “Urban” can be defined as an initial response time within 10 minutes.

For rural response planning, the "Golden Hour" concept professed that accident patients would have a greater chance of survival when brought to a higher-level medical care facility within one hour after trauma. The idea evolved in the mid-1970s, though data validity questions exist [16,17] as some studies supported the survival of select trauma patients [17–19] while others showed the standard did not influence survival chances [16,20,21]. The US military used the Golden Hour as “a ‘matter of morale’ and a ‘moral obligation’,” and its use was continued “as a reasonable standard for establishing medical support… where numerous operations of similar risk are geographically dispersed” [20]. Here, the "Golden Hour" refers to the arrival of higher-level care responders to large-scale incidents [20]. Bowman stated that in rural areas with patient transport over one hour “ [u]rban protocols that assume rapid transportation to a medical facility may be irrelevant” [22, 23]. By these criteria, “rural” can be defined as an initial response within one hour.

4. New definitions

With urban and rural parameters established, the criterion extending further than 1 hour has not been defined. Two terms are proposed here: “Remote” and “Geographically isolated.” Currently, these terms are not used to delineate responses, do not highlight the specific complexities involved, and do not have clean definitions. Assumptions embedded in standard urban or rural processes, formulas, and understandings are not accurate for remote or geographically isolated locations. Designation of what constitutes urban infrastructure differs vastly from remote or geographically isolated communities. For example, urban infrastructure may consist of piped freshwater and wastewater delivery systems with sewage treatment versus water delivery and "honey buckets" dumped on the ground in geographically isolated areas.

Wilderness medicine was developed to address incidents “characterized by delayed or prolonged (over 1 hour) patient transport” [23] to higher-level medical care facilities; this prolonged transport is typical of large disasters. Wilderness medicine acknowledges the complexities of remote and geographically isolated terrain in treatment, patient transport, and timespan to higher medical care [24]. Despite improvements in mobile communications, a 2009 commentary remains applicable in 2025: “ [D]ue to the often remote areas of wilderness [emergency medical service] operations, it may be impossible to contact a physician by either radio or cell phone” [24]. Note, when telecommunications, standard medical services, or access become disrupted by disasters, even urban areas can become remote or geographically isolated. Time, not distance, becomes more critical from a responder perspective in remote and geographically isolated locations.

Access is a critical parameter to consider when defining specific response categories. "Rural" remains accessible by a two-lane paved road between grain fields or a narrow mountain road. "Remote" – frontier, wilderness, bush, outback, hinterlands – replaces dirt roads with narrow trails or is inaccessible by traditional means [22,23]. There is still an ability to access a remote location, but it may take up to 24 hours. Using this criteria, “Remote” can therefore be characterized as an initial response time between one and 24 hours.

Without standard access to a location, no resource can arrive within 24 hours to provide aid, thus requiring non-standard modes of transportation. The fields of environmental genetics and evolutionary biology use the term “geographically isolated” to describe inhibited or precluded development of a species due to a physical barrier, such as oceans, mountain ranges, or other geographic features; the Galapagos Islands are an example of this genetic and biologic isolation [25,26]. In a disaster, when physical separation inhibits or precludes direct interaction due to no road or path available, adjustments from standard response plans are required for initial access. Using this criterion, “Geographically isolated” can therefore be characterized as an initial response time over 24 hours.

Emphasis on these definitions recognizes the difficulty of resource arrival. Earthquakes, typhoons, or tsunamis can block or destroy roads and bridges, limit access, and challenge distance-based or population-based measures. When an incident exhausts local response capabilities and crisis standards of care are implemented, external assistance is needed [27]. The magnitude 9.3 Sumatra earthquake and tsunami in 2004 destroyed infrastructure in Sri Lanka which delayed water-based asset access from India, only 27km (17mi) away while waves continued for 17 hours precluding both immediate local response and arrival of external personnel [28].

Locations experience reduced response capability due to physical separation of assets or lack of specialized assistance, leading to disproportionately more impacted people. The UN SIDS report noted limitations in local staff or volunteers resulted in greater reliance on international groups [8]. Local capabilities were inadequate to deal with the aftermath of the 2023 Lahaina, Hawaii, United States wildfires; thus, specialized response teams - cadaver dogs, urban search and rescue teams, and a Disaster Mortuary Operational Response Team - were flown

in from mainland US [29,30]. Infrastructure was so severely damaged after the 2024 earthquake in Port Vila, Vanuatu [31] that responders needed heavy excavators and jackhammers from outside aid sources to access victims [32], while aftershocks halted response operations [33] and airport damage caused responders to stage operations in Santos and then use alternate travel means [34]. Australian urban search and rescue teams were delayed almost 30 hours due to airport damage and poor weather [35] while New Zealand's teams experienced logistical and communication challenges [31].

The UN SIDS report also noted outside groups may not have local familiarity or cultural sensitivity [8]. Demonstrating the effects experienced by SIDS in a continental-based disaster, extratropical post-typhoon Merbok struck the high-latitude west coast of Alaska, United States in 2022 [36–38]. Merbok affected 57 Indigenous villages over a 2100km (1300mi) area with no connecting roads, rails, or electrical grids; existing aircraft flight rules and ship operation treaties limited access via air (960km or 600mi) or sea (2600km or 1600mi) due to unfavorable weather conditions. Damage to airfields blocked incoming aid and delayed arrival of outside response assets in some villages [38–41]. Weeks after the storm, disaster aid forms translated by a federal contractor were deemed culturally insensitive, "unintelligible and offensive" [42] to the local Indigenous population [43,44].

The time required for initial response assets in these sample cases was over one hour or over 24 hours, reinforcing the need to recognize time, as opposed to distance, when defining remote or geographically isolated locations. Time-based forward planning allows for pre-identification of methods to reduce arrival time, including alternative transportation, advanced recognition of concerns for operational activities, and pre-planning actions.

5. Conclusions

In any location affected by a disaster, response asset access time is crucial to saving lives. Three factors exist that affect access time in nearly every remote or geographically isolated area during disasters: 1) immediate response needs quickly overwhelm internal capacity; 2) external response assets take additional time to arrive; 3) infrastructure damage prohibits air and maritime response. Additionally, SIDS specifically are always geographically isolated due to being surrounded by water. Our Perspective, reinforced by studies and real cases, proposes four time-based definitions for adoption by emergency management professionals to use in disaster planning and response for better delivery of necessary services:

Urban: Areas of significant population with initial response times measured within 10 minutes.
Rural: Areas of population outside urban areas with initial response times between 10 minutes to one hour.
Remote: Areas of population beyond rural boundaries with limited road or trail access and initial response times measured between 1 to 24 hours.
Geographically Isolated: Areas of population with a physical boundary (mountain range or ocean) and no road access where initial response times exceed 24 hours.

Time is a critical aspect of reducing losses of life and property. Here, we argue that extending current definitions helps to reframe this issue and improve planning efforts in both normal times and those of diminished accessibility. By instituting these definitions as guidance, emergency management professionals for urban, rural, remote, and geographically isolated locations can more accurately plan their capabilities and prepare accordingly in order to save more lives.

CRediT authorship contribution statement

Daryl Schaffer: Writing – review & editing, Writing – original draft, Validation, Methodology, Data curation, Conceptualization. **Alec Bennett:** Writing – review & editing, Visualization, Validation, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

We have no conflicts of interest to disclose.

References

[1] Chomitz KM, Buys P, Thomas TS. Quantifying the rural-urban gradient in Latin America and the Caribbean. Washington, DC, USA: World Bank Publications; 2005. https://doi.org/10.1596/1813-9450-3634 [accessed 29 March 2025].
[2] Uchida H, Nelson A. Agglomeration index: Towards a new measure of urban concentration. Helsinki, Finland: United Nations University - World Institute for Development Economic Research; 2010. WIDER Working Paper 2010/029. Available from, https://www.rrojasdatabank.info/2010-29.pdf [accessed 29 March 2025].
[3] United Nations Statistics Division. Demographics and social statistics: Population density and urbanization, https://unstats.un.org/unsd/demographic/sconcerns/densurb/densurbmethods.htm; 2017 [accessed 17 March 2025].
[4] World Bank. How do we define cities, towns, and rural areas? Sustainable Cities, https://blogs.worldbank.org/en/sustainablecities/how-do-we-define-cities-towns-and-rural-areas#:~:text=Towns%20and%20semi%2Ddense%20areas%2C%20which%20have%20a%20population%20of,300%20inhabitants%20per%20km2; 2020 [accessed 17 March 2025].
[5] US Dept of Agriculture. Economic Research Service. Frontier and remote area codes, https://www.ers.usda.gov/data-products/frontier-and-remote-area-codes/; 2025 [accessed 17 March 2025].
[6] US Dept of Agriculture. Economic Research Service. What is rural?, https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural/; 2025 [accessed 17 March 2025].
[7] Dijkstra L, Florczyk AJ, Freire S, Kemper T, Melchiorri M, Pesaresi M, et al. Applying the degree of urbanisation to the globe: A new harmonised definition reveals a different picture of global urbanisation. J Urban Econ 2021;125(103312). https://doi.org/10.1016/j.jue.2020.103312.
[8] United Nations Dept of Economic and Social Affairs Office of Disaster Risk Reduction. Small island developing states (SIDS): Gaps, challenges, and constraints in means of meeting the Sendai Framework for disaster risk reduction. United Nations; 2022. Accessed March 15 2025. Available from: https://www.undrr.org/media/84914/download?startDownload=20250317.
[9] Kost GJ, Füzéry AK, Caratao LKR, Tinsay S, Zadran A, Ybañez AP. Using geographic rescue time contours, point-of-care strategies, and spatial care paths to prepare island communities for global warming, rising oceans, and weather disasters. Int J Health Geogr 2023;22(1):38. https://doi.org/10.1186/s12942-023-00359-y.
[10] ASEAN Coordinating Centre for Humanitarian Assistance. Weekly disaster update. Week 21, 22-28 May 2023; Week 22, 29 May-4 June 2023, https://ahacentre.org; 2025 [accessed 29 March 2025].
[11] Mell HK, Mumma SN, Hiestand B, Carr BG, Holland T, Stopyra J. Emergency Medical Services Response Times in Rural, Suburban, and Urban Areas. JAMA Surg. 2017;152(10):983–4. https://doi.org/10.1001/jamasurg.2017.2230.
[12] Roland HB, Curtis KJ, Malecki KM, Lee D, Bazo J, Block P. Geographic Isolation and Vulnerability Across Peru's Ecological Regions: The Influence of Regional Contexts of Extraction. Ann Am Assoc of Geogr 2023;113(9):2126–48. https://doi.org/10.1080/24694452.2023.2216762.
[13] Browne T, Veitch B, Taylor R, Smith J, Smith D, Khan F. Consequence modelling for Arctic ship evacuations using expert knowledge. Mar Policy 2021;130:104582. https://doi.org/10.1016/j.marpol.2021.104582.
[14] National Fire Protection Association. List of codes and standards, https://www.nfpa.org/for-professionals/codes-and-standards/list-of-codes-and-standards; 2024 [accessed 17 March 2025].
[15] National Volunteer Fire Council and National Fire Protection Association. Understanding & implementing standards: NFPA 1500, 1720, 1851. Greenbelt, Maryland: National Volunteer Fire Council; 2012. Accessed March 17 2025. Available from: https://www.nvfc.org/wp-content/uploads/2015/09/Standards_Guide_1500_1720_1851.pdf.
[16] Lerner EB, Moscati RM. The Golden Hour: Scientific Fact or Medical "Urban Legend"? Acad Emerg Med 2001;8:758–60. https://doi.org/10.1111/j.1553-2712.2001.tb00201.x.
[17] Rogers FB, Rittenhouse KJ, Gross BW. The golden hour in trauma: dogma or medical folklore? Injury 2015;46(4):525–7. https://doi.org/10.1016/j.injury.2014.08.043.
[18] Abhilash KPP, Sivanandan A. Early management of trauma: The golden hour. Curr Med Issues 2020;18(1):36–9. https://doi.org/10.4103/cmi.cmi_61_19.
[19] Okada K, Matsumoto H, Saito N, Yagi T, Lee M. Revision of 'golden hour' for hemodynamically unstable trauma patients: an analysis of nationwide hospital-based registry in Japan. Trauma Surg Acute Care Open 2020;5(1):e000405. https://doi.org/10.1136/tsaco-2019-000405.
[20] Beldowicz BC, Bellamy M, Modlin R. Death ignores the golden hour: the argument for mobile, farther-forward surgery. Mil Rev 2020;100(2):39–48. https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/March-April-2020/Beldowicz-Golden-Hour/.

[21] Newgard CD, Schmicker RH, Hedges JR, Trickett JP, Davis DP, Bulger EM, et al. Emergency medical services intervals and survival in trauma: assessment of the "golden hour" in a North American prospective cohort. Ann Emerg Med 2010;55 (3):235–46. https://doi.org/10.1016/j.annemergmed.2009.07.024.
[22] Bowman WD. The development and current status of wilderness prehospital emergency care in the United States. J Wilderness Med 1990;1(2):93–102. https://doi.org/10.1580/0953-9859-1.2.93.
[23] Bowman WD. Perspectives on being a wilderness physician: Is wilderness medicine more than a special body of knowledge? Wilderness Environ Med 2001;12(3): 165–7. https://doi.org/10.1580/1080-6032(2001)012 [0165:POBAWP]2.0.CO;2.
[24] Millin MG, Hawkins SC, Smith W, Wilderness EMS. In: Cone D, Brice J, Delbridge T, Myers B, editors. Emergency Medical Services: Clinical Practice and Systems Oversight. 1 ed. Hoboken, NJ, USA: John Wiley & Sons; 2009. p. 229–38.
[25] Allaby M, Park C. A dictionary of environment and conservation. 2 ed. Oxford, England: Oxford University Press; 2013. https://doi.org/10.1093/acref/9780199641666.001.0001.
[26] Orellana D, Smith F. Assesing geographic isolation of the Galapagos Islands. The International Archives of the Photogrammetry. Remote Sens Spatial Inf Sci 2016; 41:733–7. https://doi.org/10.5194/isprs-archives-XLI-B8-733-2016.
[27] Gostin LO, Hanfling D, Hanson SL, Stroud C, Altevogt BM. Guidance for establishing crisis standards of care for use in disaster situations: a letter report. Washington, DC, USA: The National Academies Press; 2009. https://doi.org/10.17226/12749. National Academies.
[28] Wijetunge JJ. Tsunami on 26 December 2004: Spatial distribution of tsunami height and the extent of inundation in Sri Lanka. Sci Tsunami Hazards 2006;24(3): 225–39. http://tsunamisociety.org/243wijet.pdf.
[29] Hawaii State Department of Health. Maui wildfires public health rapid needs assessment preliminary report. Hawaii, USA: Hawaii State Department of Health; 2023. Accessed March 29 2025. Available from, https://health.hawaii.gov/news/files/2023/10/Maui-Wildfire-RNA-Preliminary-Report.pdf.
[30] Pelletier J. Maui wildfires of August 8, 2023, Maui Police Department, preliminary after-action report. Hawaii, USA: Maui Police Department; 2024. Accessed March 15 2025. Available from https://npr.brightspotcdn.com/05/a0/3df076f54e7aa9e620d7ac6c731e/pre-aar.pdf.
[31] Radio New Zealand. Immediate response still the focus in Vanuatu, but move to rebuild coming, High Commission says, https://www.rnz.co.nz/news/national/537252/immediate-response-still-the-focus-in-vanuatu-but-move-to-rebuild-coming-high-commissioner-says; 2024 [accessed 29 March 2025].
[32] BBC News. Rescuers race to find survivors at 14 dead after Vanuatu earthquake, https://www.bbc.com/news/articles/cy4pdw1nzp9o; 2024 [accessed 29 March 2025].
[33] Radio New Zealand. Vanuatu one month on: aftershocks, a no-go zone and anxiety, https://www.rnz.co.nz/international/pacific-news/539227/vanuatu-one-month-on-aftershocks-a-no-go-zone-and-anxiety; 2025 [accessed 29 March 2025].
[34] Fiji Village News. Fiji in contact with AUS and NZ to provide assistance in Vanuatu - PM, https://www.fijivillage.com/news/Fiji-in-contact-with-AUS-and-NZ-to-provide-assistance-in-Vanuatu—PM-r4fx85/; 2024 [accessed 29 March 2025].
[35] Commonwealth of Australia. The first 48 hours: Supporting Vanuatu following disaster. Australian Government National Emergency Management Agency, https://www.nema.gov.au/about-us/media-centre/first-48-hours-supporting-vanuatu-following-disaster; 2025 [accessed 29 March 2025].
[36] Gahtan J, Knapp KR, Schreck CJ, Diamond HJ, Kossin JP, Kruk MC. International Best Track Archive for Climate Stewardship (IBTrACS) Project, Version 4r01. Subset 2022254N2158. Washington, DC, USA: NOAA National Centers for Environmental Information; 2024. https://doi.org/10.25921/82ty-9e16 [accessed 21 December 2024].
[37] Knapp KR, Kruk MC, Levinson DH, Diamond HJ, Neumann CJ. The International Best Track Archive for Climate Stewardship (IBTrACS): Unifying tropical cyclone best track data. Bull Am Meteorol Soc 2010;91:363–76. https://doi.org/10.1175/2009BAMS2755.1.
[38] State of Alaska Department of Transportation and Public Facilities. Western Alaska storm response, https://dot.alaska.gov/2022storms/; 2022 [accessed 29 March 2025].
[39] US Dept of Homeland Security, Federal Emergency Management Agency. Alaska-Severe storm, flooding, and landslides, DR-4672-AK, https://www.fema.gov/disaster/4672; 2025 [accessed 29 March 2025].
[40] Alaska Public Media, National Public Radio. Typhoon Merbok spotlights Alaska's need for science and climate-resilient infrastructure, https://alaskapublic.org/2022/09/29/typhoon-merbok-spotlights-alaskas-need-for-science-and-climate-resilient-infrastructure/; 2022 [accessed 29 March 2025].
[41] US Geological Survey. USGS Flood event viewer: 2022 September AK extratropical cyclone. Washington, DC, USA: US Dept of the Interior; 2025. Available from, https://stn.wim.usgs.gov/FEV/#2022SeptemberAKExtratropicalCyclone [Accessed 29 March 2025].
[42] Salvano-Dunn D, Office for Civil Rights and Civil Liberties. FEMA's outreach and recovery assistance to tribes and tribal communities in Alaska complaint no. 005539-23-FEMA. Washington, DC, USA: US Dept of Homeland Security; 2023. Accessed March 29 2025. Available from https://npr.brightspotcdn.com/33/17/bcaa6938498f85e914c887d5d7a5/23-0908-crcl-retention-memo-to-fema-tribal-communities-in-alaska-redacted-508.pdf.
[43] KTOO. FEMA sent 'unintelligible' disaster relief information to Alaska Native people after Typhoon Merbok, https://www.ktoo.org/2023/01/09/fema-sent-unintelligible-disaster-relief-information-to-alaska-native-people-after-typhoon-merbok/; 2023 [accessed 29 March 2025].
[44] Associated Press. FEMA fires group for nonsensical Alaska Native translations, https://apnews.com/article/fema-alaskan-native-wrong-translations-707ab611f0d171ae2e34fc3f284454a7; 2023 [accessed 29 March 2025].