[GS-02-028] GIS&T and Community Engagement

Abstract

URISA’s GISCorps is a case study in community engagement by members of the GIS&T community, whether for purposes of community service or service learning. Since 2004, GISCorps volunteers have contributed their GIS&T expertise to organizations and communities in need all over the world. In doing so, volunteers make a positive difference to the broader community while gaining experience, developing skills, and expanding professional networks.

Keywords: community, crowdsourcing, disaster response, volunteering

Author & citation

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Explanation

1. Definitions

Community Engagement: Here, community engagement refers to engagement by members of the GIS&T community with the larger community for the purpose of community service or service learning.

Core Committee: The governing body of GISCorps. Up to nine volunteer Core Committee members serve renewable three-year terms, managing projects and overseeing the day-to-day operations of GISCorps.

Crowdsourcing: A data creation process wherein data are contributed or collected from unknown members of the public (“the crowd”) or, in some cases, a bounded group of trusted individuals or experts (Bowser and Shanley 2013).

Mission: In the context of GISCorps, a mission is a discrete project undertaken by one or more volunteers in collaboration with and for the benefit of a partner organization.

Partner Organization: In the context of GISCorps, a partner organization is a group or

entity that has requested the help of GISCorps volunteers. While they are usually nonprofit organizations, they can occasionally be government agencies, businesses, associations, or loosely-organized groups of concerned citizens.

Volunteer: A person who provides a service without receiving financial compensation.

2. Introduction

The term community engagement has more than one interpretation. It can refer to the practice of communicating with and soliciting input from members of the public to educate stakeholders, shape policy, and inform decision making (Smardon 2018). Geographic Information Science and Technology (GIS&T) has a role in that form of community engagement (see GIS Participatory Modeling, Public Participation GIS, Public Participation in Governing, and GIS&T and Geodesign), but here we discuss a second interpretation of the term, in which community engagement is an umbrella term encompassing community service and service learning (Crosby & Brockmeier 2016). In the context of GIS&T, community service refers to members of the GIS&T profession using their skills to serve, or "give back," to the community, and service learning refers to learning or developing GIS&T skills through service to the community. In both cases, the term community is used broadly here, and can refer to one's local community or the global community.

In this topic, we examine GISCorps as a case study in community engagement. We also point to other organizations that provide similar opportunities for members of the GIS&T profession to engage with and serve the communities they care about. Finally, we discuss challenges faced by GISCorps and make recommendations for enhancing and sustaining the effectiveness of community engagement programs within the GIS&T community.

GISCorps, a program of the Urban and Regional Information Systems Association (URISA, a professional association), enables members of the GIS&T profession to use their skills and expertise to support nonprofit organizations and communities in need through short-term volunteer missions, fulfilling the community service half of the community engagement definition discussed here. Over time, GISCorps has also proved to be a vehicle for service learning, providing students and early-career professionals an opportunity to gain valuable skills, experience, and contacts to inform their career directions and enhance their employment prospects. It also offers seasoned GIS&T practitioners an opportunity for continuing education, allowing them to explore new subject areas and expand their competencies beyond the GIS&T skills they use in their daily jobs.

3. History of URISA's GISCorps

GISCorps was conceived in 2001 when its founder, Shoreh Elhami, began to wonder if GIS professionals could extend their expertise to communities in need and offer those services on a volunteer basis for a short period of time. Elhami believed that many of her colleagues in the GIS&T community shared an untapped willingness to use their specialized knowledge to engage with and support communities struggling to deal with natural disasters, poverty, hunger, public health challenges, environmental degradation, and more. She also believed that there were many nonprofit organizations, grassroots community groups, and

underfunded institutions in developing countries that would benefit from short-term GIS services provided pro bono by skilled professionals. Elhami shared her idea with colleagues at the 2001 URISA Annual Conference Board Meeting in Long Beach, California, and GISCorps began to take shape.

Nearly three more years of collaboration and planning would be required before GISCorps would be ready to launch its first mission. In the fall of 2002, Elhami submitted a report to colleagues on URISA's International Task Force outlining her idea. The document described the basic premise of GISCorps: a volunteer leadership team would vet organizations and projects for suitability and need, and carefully select the most qualified volunteers for each project.

As planning continued and Elhami shared her concept with colleagues and industry leaders, it became increasingly apparent that many members of the GIS&T community were interested in the idea of using their skills to make a difference beyond the scopes of their everyday professional roles. By the summer of 2003, more than two dozen people had registered as volunteers using a newly unveiled online application.

Elhami and a small group of volunteers—Juna Papajorgji, Ed Wells, and Martha Lombard—developed and documented a plan to establish GISCorps as an initiative operating under the auspices of URISA; URISA's Board of Directors unanimously endorsed the plan in October 2003. The first GISCorps Core Committee was formed soon after, focusing on writing strategic and operational plans and developing a GISCorps website, which made its debut in the summer of 2004.

Finally, in September 2004, the Core Committee launched the first GISCorps mission, sending Lombard to Peru to provide expertise for a World Bank effort to evaluate GIS capacity and develop a street addressing methodology in the Sacred Valley of the Incas. Shortly thereafter, on December 26, 2004, the Sumatra–Andaman earthquake struck off the coast of Indonesia, causing a series of 30-meter tsunami waves that devastated coastal communities in countries surrounding the Indian Ocean, killing over 225,000 people. GISCorps responded quickly, partnering with Global MapAid to send volunteer Frank Chang to Indonesia to perform a detailed GIS needs assessment. That mission would be the first of many GISCorps disaster response missions; almost 40% of GISCorps missions have been launched in response to natural disasters (GISCorps Core Committee 2021). Figure 1 shows the locations of all current and past GISCorps missions, with disaster response missions shown in yellow.

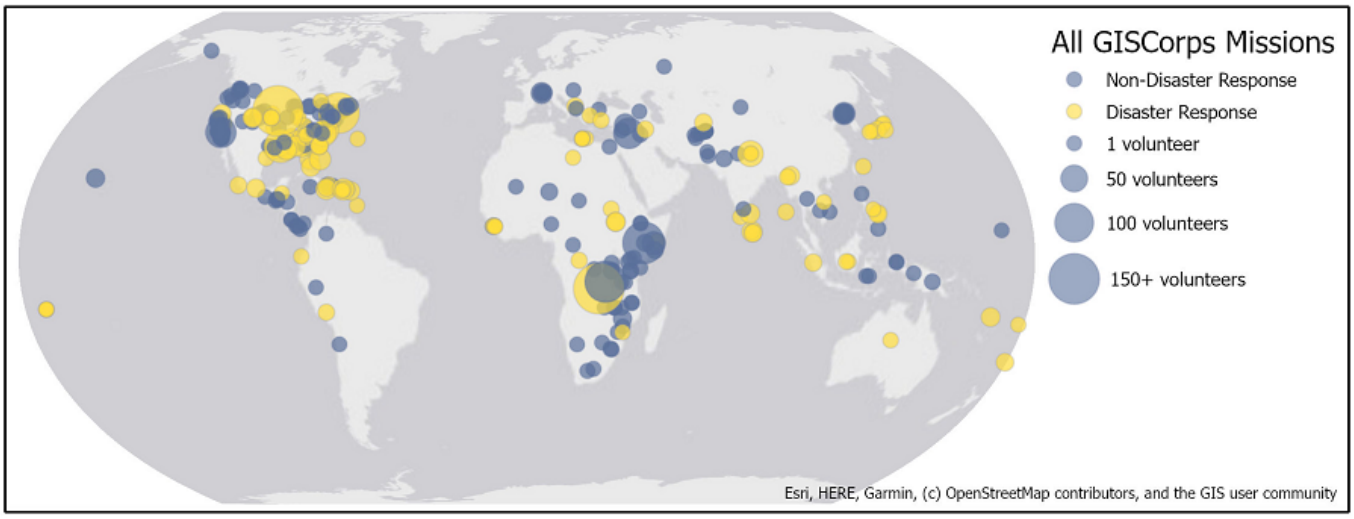

Figure 1. Current and completed GISCorps Mission locations. Source: authors.

Twenty years on, Elhami's hunch about the GIS&T community's shared desire to serve has been borne out by the fact that GISCorps consistently has more willing, qualified volunteers than volunteer positions to fill. As of May 2021, GISCorps has about 7,000 registered volunteers living in 130 countries. The Core Committee has filled over 2,800 volunteer positions for projects benefiting 160 partner organizations in 80 countries. GISCorps volunteers have collectively provided more than 85,000 hours of skilled GIS&T services since 2004 (GISCorps Core Committee 2021). As the number of missions launched each year increased (Figure 2), the Core Committee expanded to nine members serving renewable three-year terms in 2017, the Core Committee hired a part-time Program Coordinator to provide day-to-day operational support in 2018, and a three-member Advisory Board was formed in 2019.

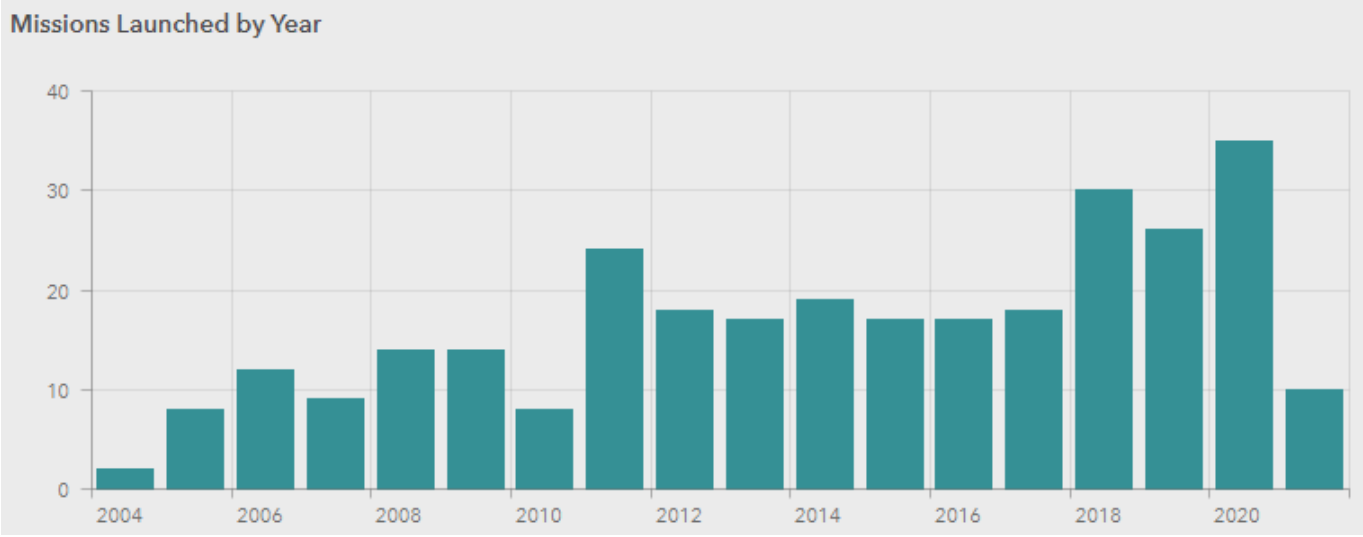

Figure 2. GISCorps Missions launched by year. Source: authors.

4. Volunteers

GISCorps membership is open to anyone in the GIS&T community, and volunteers bring a wide range of skills, education, and experience. Each volunteer maintains a profile detailing their software and development skills, their GIS workflow experience, and their subject matter expertise. There is no minimum level of experience required to join GISCorps, but many volunteer opportunities have stringent requirements and the volunteer selection process can be competitive. Conversely, some large-scale missions are open to anyone interested in participating. This mission category often produces large volumes of urgently needed data in areas affected by natural disasters while providing service learning opportunities for volunteers of all skill levels.

Volunteers have expressed various motivations for joining GISCorps. These include a desire to make a difference or give back to the wider community, an interest in developing technical skills or exploring subject areas outside one's professional domain, the appeal of networking opportunities and camaraderie, and the prospect of earning points for GIS Professional (GISP) certification or recertification.

After providing virtual ArcGIS Online training to faculty and staff at the Southern African Wildlife College in the spring of 2021, Canadian volunteer Shawn Morgan described his perspective on the professional benefits of community service: "The opportunity provided through GISCorps really helped me stretch my skills, increase my professional contacts, and have fun applying my skills to real-world problems that make a difference."

For students of GIS&T, volunteering can be a valuable opportunity to build fundamental skills and gain experience. Canadian volunteer Maggie Peng was an undergraduate student when she was selected to assist Charity Co-Op, a cooperative of anti-poverty programs in Detroit, by developing a map interface for a SmartSheet application. After completing her project, she said, "I am very happy that I had the chance to work on this project. It really surprised me how much that I actually learnt from it."

5. Missions

GISCorps missions are always partner-driven; unlike some organizations, GISCorps does not self-deploy (volunteer projects conducted through the GIS Service Pledge Program are exceptions; see Section 5.2). Potential partner organizations generally learn about GISCorps at conferences where GISCorps volunteers present or host a booth, through Esri's Nonprofit Program, or by conducting an internet search.

A mission begins when an organization requests one or more volunteers by submitting a Volunteer Request form on the GISCorps website. The Core Committee reviews each request, assessing it to ensure that the partner organization has no profit motive in engaging GISCorps volunteers, that hiring paid consultants to do the work is not possible, and that the mission will provide a humanitarian, environmental, public health, educational, social justice, or economic development benefit to a community in need.

When these criteria are met, members of the Core Committee meet with representatives of the partner organization to assess and define the project objectives, scope, and technical requirements. Core Committee members strive to recommend the most appropriate and sustainable solutions for each partner and mission, remaining unbiased and avoiding opportunities for personal gain (Elhami et al. 2019). One Core Committee member then

takes ownership of the mission and starts the recruiting process by drafting a job description for the volunteer positions required to complete the work. A well-crafted job description has proven foundational to the success of a mission, as it documents the project scope, timeline, requirements, work location, and deliverables, setting expectations for both volunteers and partner organizations.

Because GISCorps missions are partner-driven, any data, maps, applications, documentation, or other products created by GISCorps volunteers during the course of a mission are the sole property and responsibility of the partner organization. Likewise, the GISCorps Core Committee honors partner preferences regarding sharing mission details, though transparency and openness are preferred.

5.1 Mission Types

GISCorps missions fall into two broad categories: standard missions and large-scale missions. For both categories, volunteers are often able to perform their work remotely thanks to the expansion of high-speed internet access and the rise of cloud computing. Between 2004 and 2014, 73% of GISCorps missions launched were completed remotely, while 94% of missions launched since 2015 have been remote (GISCorps Core Committee 2021).

Standard missions generally pair one to several volunteers with a partner organization and involve a competitive selection process. After recruiting the most qualified volunteers for the job, the Core Committee member steps back and the volunteers engage directly with the partner organization. For standard missions, volunteers generally contribute between five and ten hours of work per week over a period of months. Standard missions often entail consulting (needs assessments, mentoring), data integration, application development, GIS training, and data analysis and visualization. Figure 3 shows the relative frequency of ten broad categories of GISCorps missions when a single principal category is assigned to each mission.

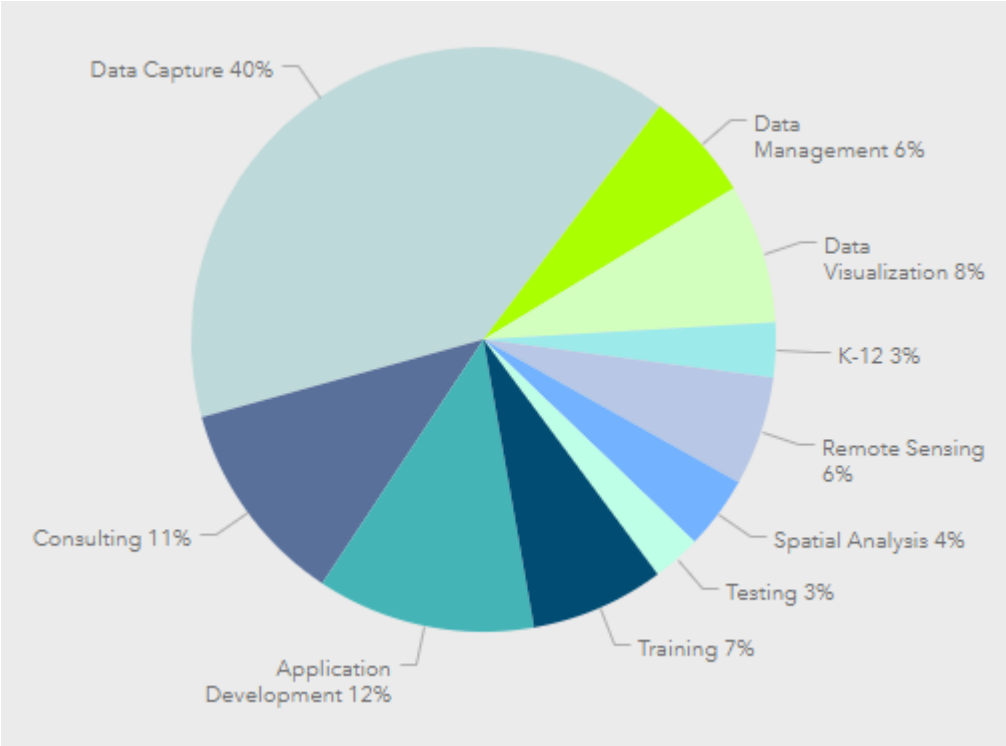

Figure 3. Main areas of focus for GISCorps Missions. Source: authors.

Large-scale missions, on the other hand, engage greater numbers of volunteers—from tens to hundreds—and rarely involve a competitive selection process. Because they are open to participation by volunteers with a broad range of skills and experience and do not require an extended commitment, large-scale missions are valuable not only to the partner organizations and communities they serve, but also to volunteers who are interested in community service and service learning but lack the credentials or time required for a standard GISCorps mission.

The majority of large-scale missions involve data capture or cleanup, usually in response to a natural disaster or other crisis. These missions are often crowdsourcing efforts in which large numbers of trained volunteers create data by digitizing imagery or by mining public sources like social media posts, news outlets, and authoritative websites. Because partner organizations tend to be overwhelmed in times of crisis, the Core Committee is often tasked with hands-on mission administration from start to finish. Volunteers often work together in a web-based application built by the Core Committee or the partner organization and collaborate in an online environment such as Slack. Volunteers work as much or as little as they are able over an intense period of days or weeks.

- **Standard Mission Example: Bangalore Health Data**

A grassroots community group in South India had acquired data pertaining to rates of noncommunicable diseases and other systemic public health issues in the Bangalore area. The group requested help from GISCorps in performing spatial and statistical analysis of the data so that they could present it to local leaders with the hope of informing public health policy decisions. The group requested that free and open source GIS software be used for the project. Canadian volunteer Nicole White performed the work using QGIS and Excel, created maps (Figure 4), drafted a report detailing the results of her analysis, and produced a series of tutorial videos to help the group perform their own spatial analyses in the future.

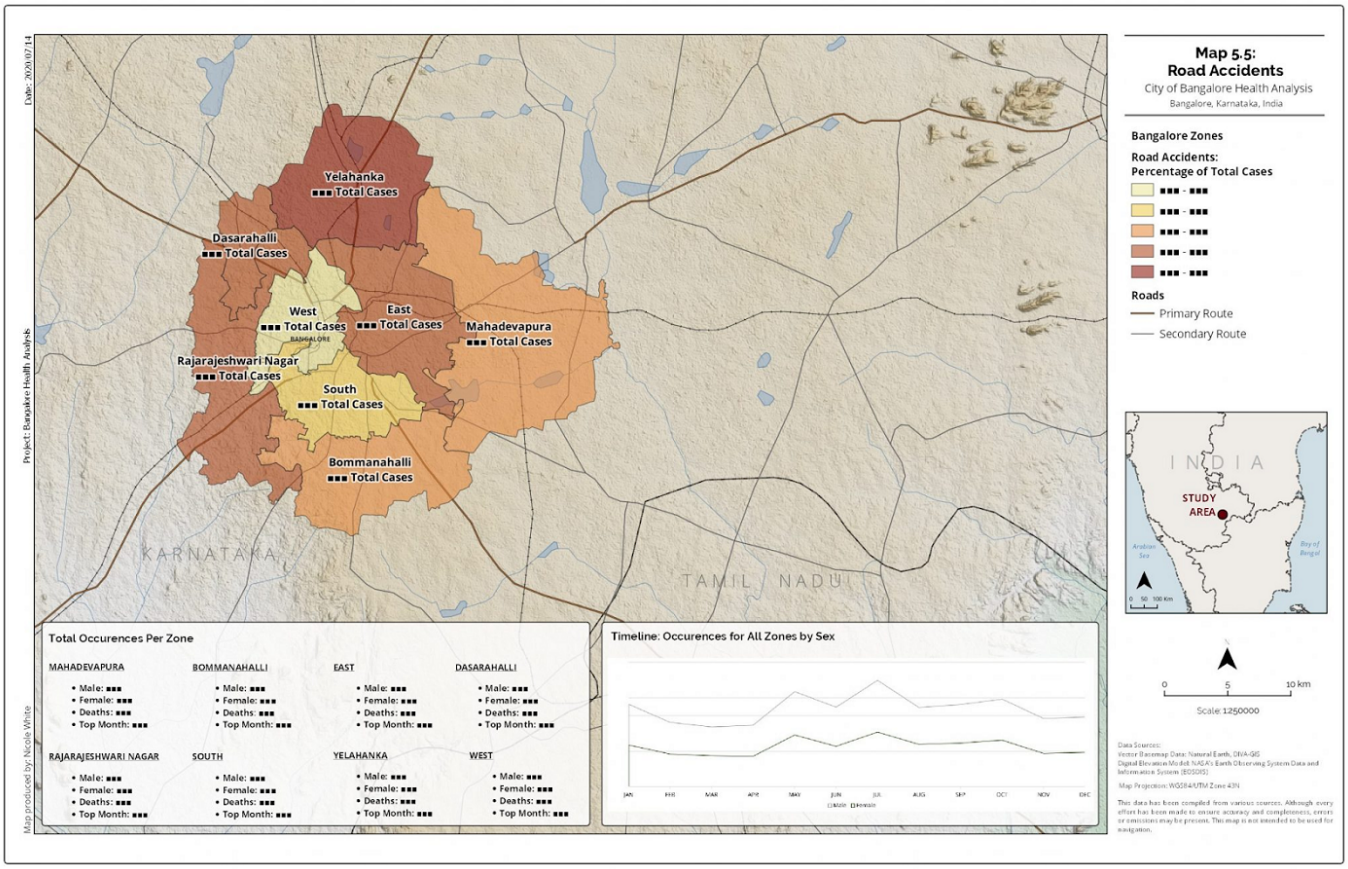

Figure 4. Map showing road accident rates in Bangalore, India, as an example of a GISCorps Standard Mission product. Source: authors.

- **Standard Mission Example: Animal Search and Rescue Dashboard**

Animal Search and Rescue (ASAR) Training and Response is a nonprofit organization dedicated to evacuating and rescuing pets and other animals during natural disasters. In the fall of 2020, ASAR representatives requested help from GISCorps to create an ArcGIS Online dashboard to visualize data submitted by ASAR teams in the field. This dashboard would help ASAR and their emergency management partners track evacuated and rescued animals and coordinate communication and reunification with owners. Roger Jelinek, from the United States, was selected for the role and completed the work in time for the 2021 hurricane season. Figure 5 shows the result of Roger's collaboration with ASAR.

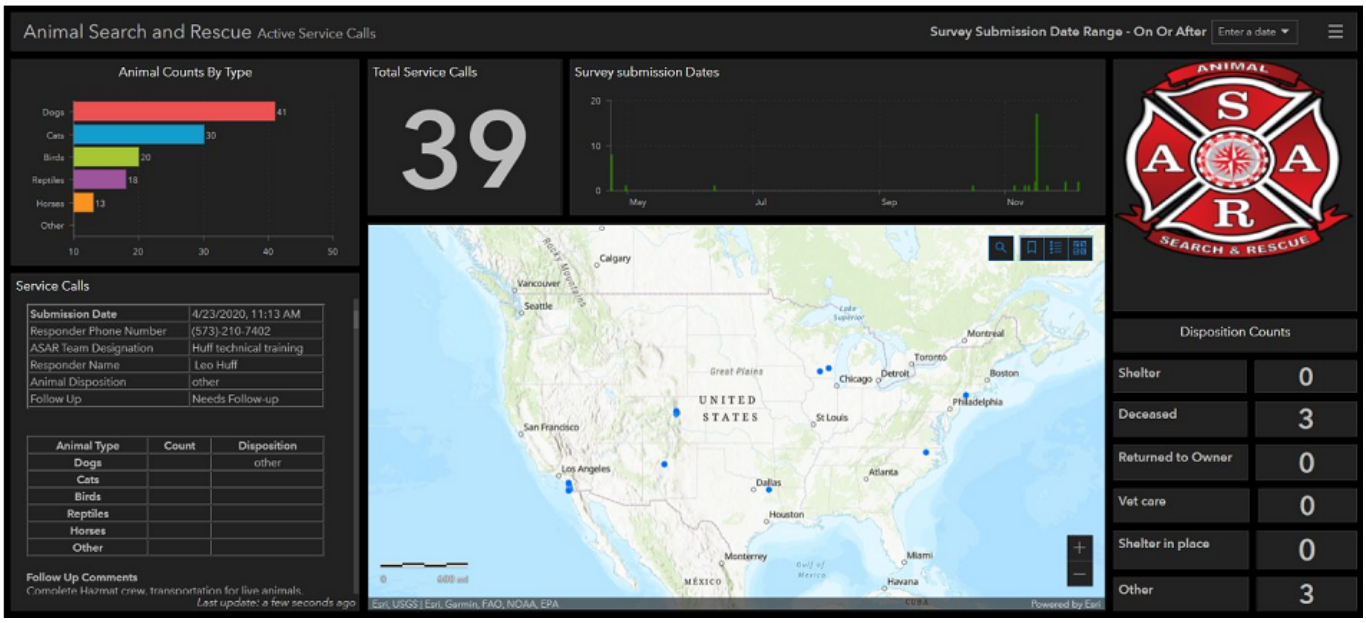

Figure 5. Animal Search and Rescue dashboard displaying active service calls, as an example of a GISCorps Standard Mission product. Source: authors.

- **Large-Scale Mission Example: COVID-19 Testing and Vaccination Sites**

  When the COVID-19 pandemic began spreading across the globe in early 2020, government agencies, journalists, and others needed a free and open nationwide dataset of testing locations in the United States and its territories. Because no one else was creating and sharing this important data source, representatives of Esri's Disaster Response Program requested help from GISCorps volunteers. GISCorps staff and Core Committee members quickly built a web application and invited volunteers in the United States to begin scouring local government and healthcare provider websites and mapping the locations of testing sites nationwide (vaccination sites were added in January 2021). Hundreds of volunteers joined the project and mapped over 60,000 COVID-19 testing and vaccination site locations over the course of a year in what proved to be an unusually large and unusually long disaster response mission. Public forms allowed healthcare providers and others to add testing and vaccination sites to the map as well, and volunteers verified each submission. The dataset has been viewed over 15 million times.

  The volunteer portal used throughout the COVID-19 Testing and Vaccination Site Mapping Mission is shown in Figure 6. Large-scale missions often employ gamification (see Citizen Science for GIS&T) in the form of leaderboards to help maintain volunteer motivation. The Covid-19 Testing in the United States dashboard pictured in Figure 7 is one of several public-facing apps produced by mission volunteers.

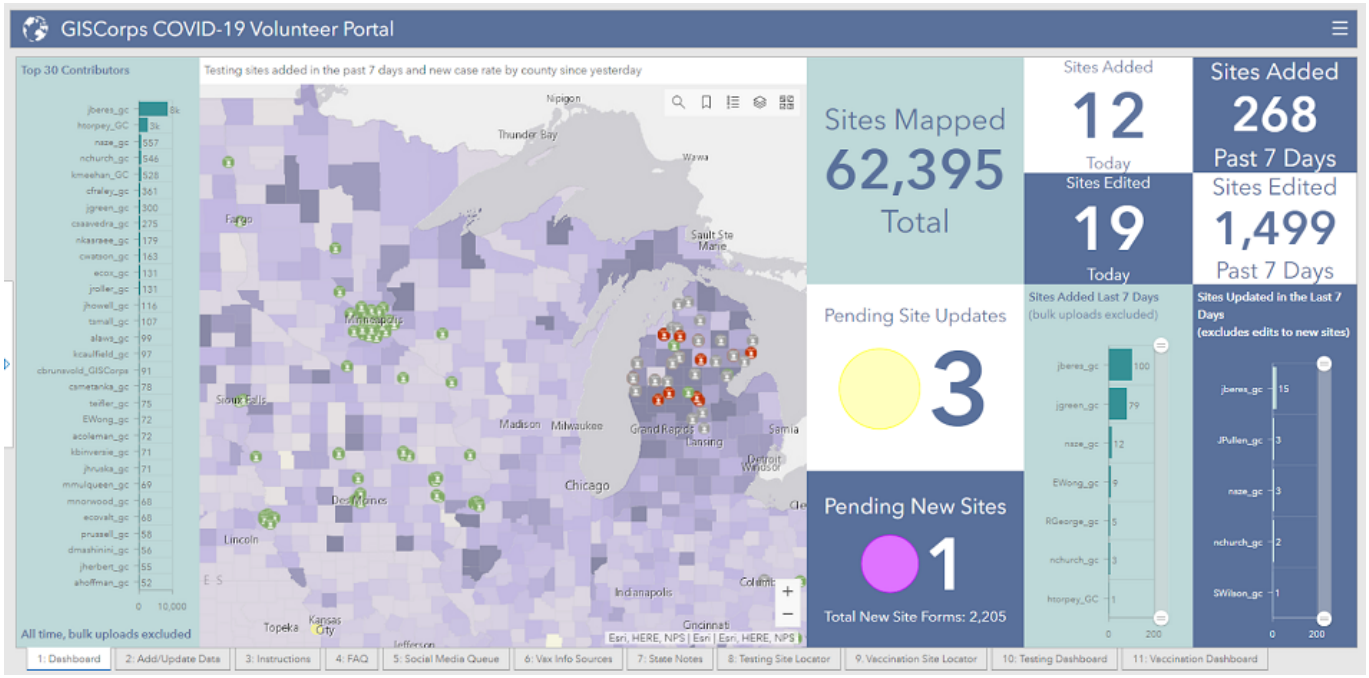

Figure 6. COVID-19 Testing and Vaccination Site Volunteer Mapping Portal, as an example of a GISCorps Large-Scale Mission product. Source: authors.

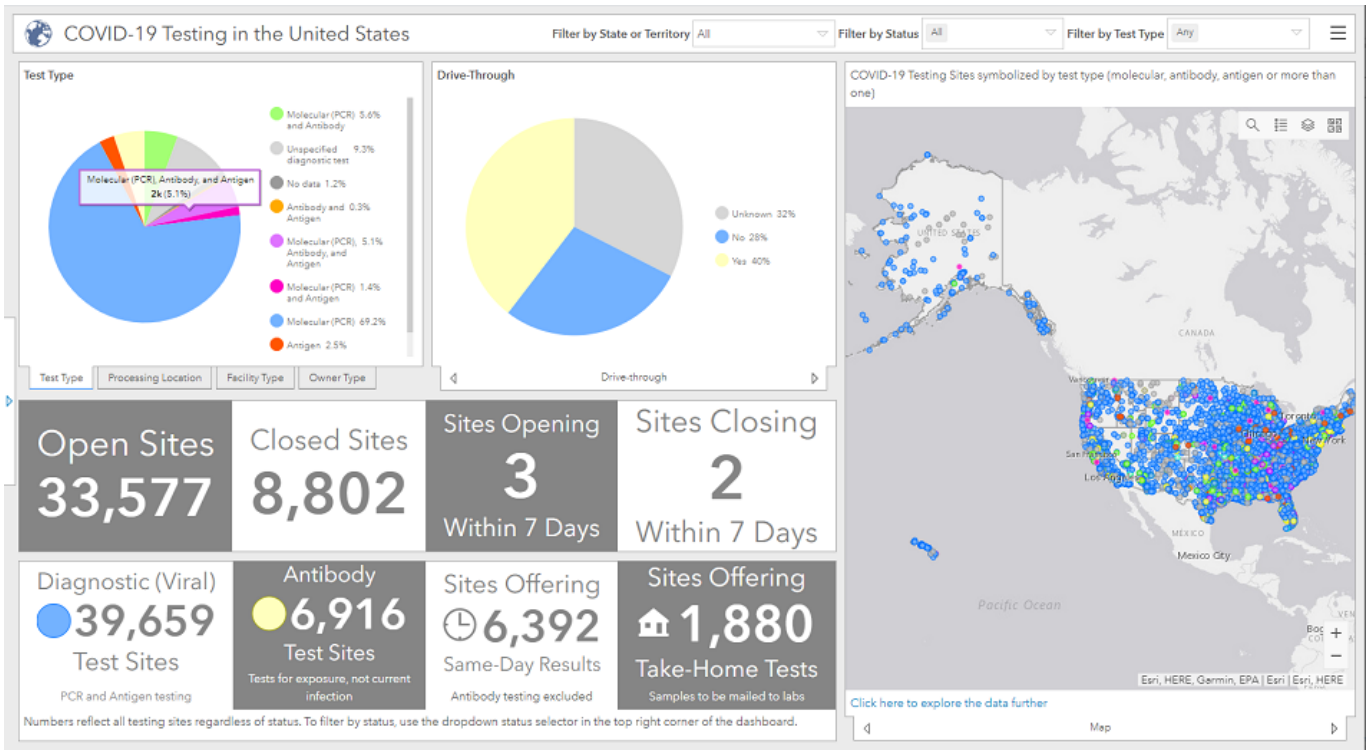

Figure 7. COVID-10 Testing in the United States dashboard, as an example of a GISCorps Large-Scale Mission product. Source: authors.

- **Large-Scale Mission Example: PhotoMappers**

PhotoMappers is a multiyear collaboration between the National Alliance for Public Safety GIS Foundation (NAPSG) and GISCorps. Whenever a major hurricane threatens communities in the United States or its territories, NAPSG activates the PhotoMappers team. Volunteers work together in the custom web application shown in Figure 8 to geolocate and map on-the-ground photos sourced from public social media accounts and news outlets.

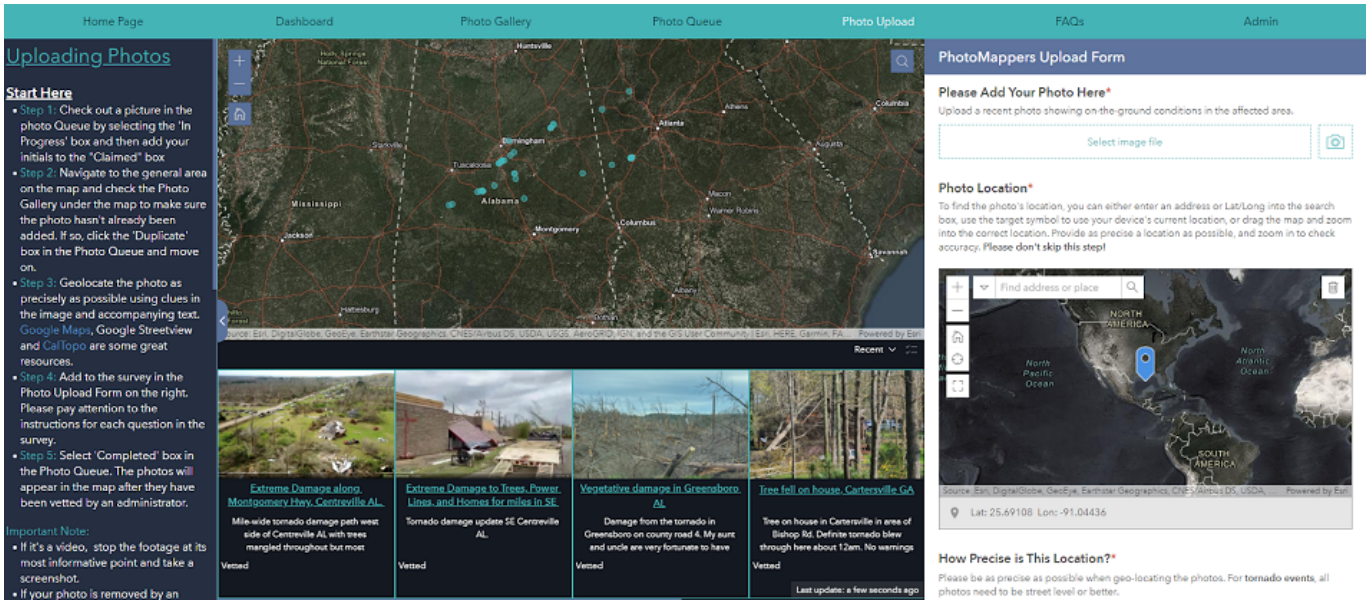

Figure 8. PhotoMappers Volunteer Portal, as an example of a GISCorps Large-Scale Mission product. Source: authors.

Photo locations are identified as precisely as possible using clues in the photo or the accompanying text and by comparing photos to satellite and street-level imagery. Volunteers upload geolocated photos in the PhotoMappers Volunteer Portal, an Esri Experience Builder application with an embedded Survey123 form. Other Volunteer Portal tabs display instructions, statistics about the mission, and a queue of photos waiting to be geolocated. In the Admin tab, an experienced Admin Team member validates each submission and adds FEMA Lifelines and building damage scores.The resulting data are displayed in emergency operations centers around the country, providing rapid situational awareness to emergency managers and first responders.

5.2 GIS Service Pledge Program

The GIS Service Pledge Program is a partnership between GISCorps and Esri. Through this program, GISCorps volunteers can devise and execute their own projects in collaboration with a local organization they care about. The program was developed in hopes of creating more community service and service learning opportunities for GISCorps volunteers, with the added benefit of bringing GIS to organizations that might not otherwise have known that they could request help from GISCorps.

Volunteers apply for the program by filling out an online form, and members of the GISCorps Core Committee review each GIS Service Pledge application. When an application

is approved, Esri grants a free one-year personal use license to the applicant for the purpose of carrying out the proposed project.

6. Other GIS&T Organizations Engaging with the Community

GISCorps is not the only organization that provides the global GIS&T community with opportunities for community service or service learning. Other organizations include Global Map Aid, Map Action, Humanitarian OpenStreetMap Team and the Missing Maps project, YouthMappers, GeoChicas, local MapTime chapters, and many others.

7. Challenges

While GISCorps continues to increase the number of missions launched most years, volunteer interest in community service and service learning continues to outpace the availability of volunteer opportunities. This is especially true outside of the United States, since the majority of large-scale disaster response missions are requested by U.S.-based nonprofits and government agencies. Since large-scale disaster response missions are the most common source of opportunities for volunteers with limited experience, students and early-career GIS&T community members outside the United States sometimes express frustration about the lack of service learning opportunities available to them.

The primary reason for this imbalance is that GISCorps lacks funding to hire staff to cultivate partnerships and manage additional large-scale disaster response missions. While there is no shortage of volunteers interested in short-term opportunities to serve, it can be difficult to find volunteer Core Committee members who are able to commit the time and energy necessary to manage these short-term projects year-round in addition to their daily career duties. Large-scale disaster response missions in particular require project managers to be available for intermittent periods of intense activity at unpredictable intervals and varying durations. The demands of managing these U.S.-based disaster response missions leaves the Core Committee with insufficient time and resources for the kind of outreach activities that could generate more international opportunities. Further efforts are needed to educate potential partner organizations and agencies outside the United States about the services GISCorps volunteers can provide.

8. Recommendations

Hiring skilled staff to support project management and outreach would allow GISCorps to provide community service and service learning opportunities to more volunteers, but the fundraising and grant writing required to sustainably fund those positions requires the attention of a full-time professional as well. If GISCorps leadership wishes to continue the organization’s trend of expanding its reach and providing the international GIS&T community with more opportunities for community engagement, they will likely need to develop a strategy for securing funding and staff.

Beyond GISCorps, additional opportunities exist for providing GIS&T students and early-

career professionals with service learning and community service opportunities. One idea is the establishment of an international university-based service organization with individual chapters focused on preparing students to provide short-term GIS support in the wake of natural disasters or humanitarian crises. Members and alumni of these chapters could then be activated by nonprofit organizations to complete short-term GIS&T projects or participate in map-a-thons, hack-a-thons, and other service opportunities as needs are identified. Participants would gain experience and exposure to real-world GIS&T applications while providing a valuable service to communities in need. The YouthMappers program is an example of this type of model with a focus on student contributions to OpenStreetMap (YouthMappers 2021).

Finally, if government agencies value the skilled work and expert crowdsourcing that volunteers with GISCorps and other GIS&T service organizations provide during and after natural disasters, they would do well to consider establishing a geospatial reservist program. Geospatial reservist programs would allow governments greater control over all aspects of the program, including requirements, training, security clearances, services, and availability. Geospatial reservists could be compensated when called to active duty and for participating in regular training exercises and disaster preparation activities, and employers could be required to grant leave for active deployments. Reservists could be deployed to jurisdictions that lack the GIS&T capacity to respond effectively to extreme events such as wildfires, earthquakes, tornadoes, floods, and hurricanes. They could assist with data creation, collection, quality control, analysis, and visualization associated with evacuations, resource allocation, damage assessment, and more. In return, reservists would develop skills, build their resumes, and experience the satisfaction of community service.

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