EMERGENCY RESPONSE IN KENYA

SUPPORTING FLOOD RELIEF

MAY-JUNE 2024

CONTENTS

OVERVIEW

In May 2024, in the aftermath of severe rainfalls, flash floods, and escalated river levels, Help.NGO was mobilized to Kenya to bolster emergency response initiatives. The National Disaster Operations Centre (NDOC) disclosed that the period from March to May saw a tragic loss of approximately 291 lives, 188 injuries, and the disappearance of 75 individuals. The deluge uprooted nearly 300,000 people and impacted over 410,000 lives. Significant damage to infrastructure, especially in Nairobi County and its nearby regions, necessitated urgent evacuation.

Help.NGO provided critical support to local organizations by deploying five subject matter experts (SMEs), including specialists in connectivity and drone technology. The team also introduced advanced cloud computing resources and connectivity solutions to partners working in the affected regions. Over the course of their mission, they conducted 74 drone flights, mapping an area of 44.1 km² and collecting 286.5 GB of crucial data. Additionally, eight Starlink units were installed, providing connectivity for more than 63,000 individuals, including humanitarian responders, students, and members of the Maasai communities.

Operating across 13 Kenyan counties—Busia, Kwale, Garissa, Kajiado, Kericho, Kiambu, Kilifi, Kisumu, Lamu, Machakos, Mombasa, Nairobi, and Siaya—Help.NGO focused on mapping key regions, including the Tana Delta and the Nairobi River. These operations were facilitated through partnerships with the Kenya Red Cross Society, the Internet Society (ISOC) Kenya Chapter, and Gonline Africa. Over 100 GB of collected data was processed and distributed to partners using Amazon Web Services (AWS) and WebODM. Additionally, in collaboration with the Kenya Red Cross Society and International Center for Humanitarian Affairs (ICHA), Help.NGO offered technical training to local staff, enhancing the mapping of crucial infrastructure and bolstering search and rescue capabilities.

KEY FIGURES

6 UNMANNED AERIAL SYSTEMS (UAS) conducting **74** FLIGHTS

44 SQUARE KILOMETERS across **13** COUNTIES
of affected areas mapped

8 LEO SATELLITE TERMINALS for **63K** USERS
deployed to provide connectivity incl. responders, humanitarians, students, and affected people

BACKGROUND

Kenya's susceptibility to the impacts of climate change is markedly high, with an increased frequency and intensity of extreme weather events, including heavy rain, floods, and droughts. Recent severe rainfall has amplified these vulnerabilities, resulting in extensive infrastructure damage, community displacement, and loss of life. Given its diverse geography—which spans low-lying coastal regions, arid and semi-arid areas, and densely populated urban centers—Kenya is distinctly exposed to climate-related risks.

The growing unpredictability of weather patterns presents challenges for agriculture, water resources, and public health. Consequently, there is an urgent need for strong emergency preparedness and response strategies to counteract the negative consequences of climate change. Investments in early warning systems, resilient infrastructure, community education, and quick response capabilities are vital in bolstering Kenya's resilience and protecting its population against future climate-related disasters.

HELP.NGO INTERVENTION

UAS OPERATIONS: COMMUNITY MAPPING & DAMAGE ASSESSMENT

Help.NGO utilizes unmanned aerial systems (UAS) to enhance emergency preparedness and response efforts, specifically by mapping and documenting areas impacted by crises.

Responding to the 2024 floods in Kenya, we played a significant role in assisting local partners to map and monitor areas affected by or vulnerable to flooding. Our efforts culminated in the extensive collection of data and mapping of critical areas, thereby improving the efficiency and efficacy of disaster responses. Experts from Help.NGO mapped a total area of 44.1 km² across 13 counties, gathering 286.5 GB of data.

Our drone operations extended to mapping critical infrastructures such as hospitals, schools, government buildings, and bridges. These activities not only supported search and rescue operations but also generated essential imagery and models for needs assessment and planning.

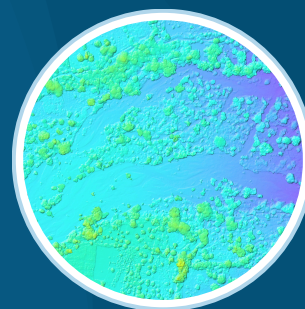**Help.NGO experts processed the collected data into the following outputs:**

MEDIUM-RESOLUTION AERIAL IMAGERY FOR ASSESSMENT
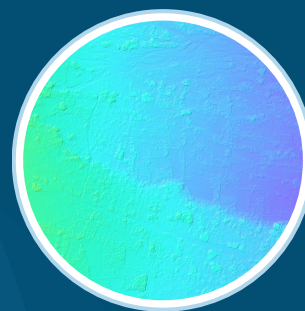
DIGITAL ELEVATION MODELS (DEM)

3D IMAGERY

DIGITAL TERRAIN MODELS (DTM)

Through its UAS operations, Help.NGO has been instrumental in capturing detailed imagery of areas affected by flooding. This important data collection initiative contributes significantly to disaster response planning and recovery efforts. Our collaborative approach with local partners guarantees the optimal utilization of this data, which is an essential component in mitigating the impacts of crises and fostering community resilience.

NGURUMAN AND ENTASOPIA MAPPING

- Highlighted areas/assets: Nguruman village, Entasopia Polytechnic School and Entasopia Health Center.
- Output: Aerial footage and maps vividly delineating the extent of the damage. These materials were instrumental in assessing the damage and formulating plans for reconstruction.

TRIBUTARIES ALONG THE NAIROBI RIVER

- Highlighted areas/assets: Ruai, Chokaa, New Njiru Town, and sections of the Dandora estate.
- Output: Comprehensive maps delineating the impacts of flooding on the Nairobi River.

KAMUKURU TOWN AND AREAS

- Highlighted areas/assets: Regions inhabited by the Maasai community.
- Output: Maps illustrating the extent of flood damage.

OGENYA KANYANGWAL

- Highlighted areas/assets: Evacuation Center, an area regularly impacted by flooding; home to 25,000 residents, of which 2,000 currently reside in temporary camps.
- Output: Maps developed to assist in disaster response and future preparedness; these were presented to the local chief, demonstrating the extent of damage, such as the destruction of four schools.

KISUMU COUNTY

- Highlighted areas/assets: Domiciles of the farming community situated along the dike and the impacted rice fields.
- Output: Maps for relocation planning and damage assessment, covering 11 towns along the lake shore and the damaged rice fields; future applications of these maps include mosquito management and site identification for community relocation.

BUSIA COUNTY

- Highlighted areas/assets: Village cluster with 5,000 residents, affected by road loss, requiring boat or water commutes; additionally, 3 Red Cross camps near burial grounds with environmental concerns.
- Output: Maps used to advocate for infrastructure improvements, intended for use in lobbying interactions with the government.
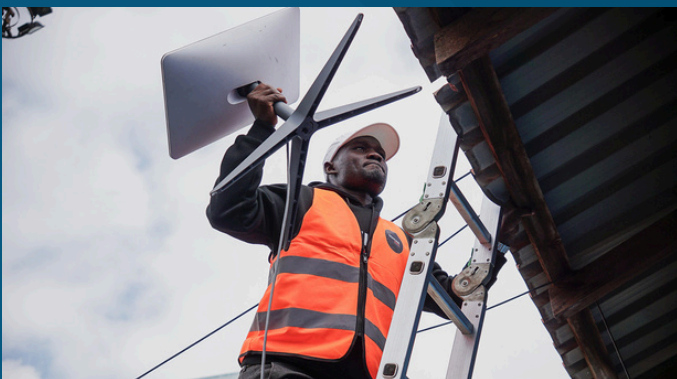
CONNECTIVITY

In response to requests from local organizations, Help.NGO deployed LEO connectivity units to enhance communication in areas where networks had been disrupted. This initiative aimed to support ongoing emergency, search & rescue operations, facilitate continuous learning, and improve overall connectivity in remote and underserved locations, benefiting both response teams and local residents.

NAMELOK WITH ISOC

Successfully established internet access for an estimated 30,000 individuals residing in the rural farming region situated south of Nairobi. Furthermore, high-resolution maps of the surrounding area wer created to assist local planners and facilitate subsequent development endeavors.

KIBERA SLUMS WITH ISOC AND GONLINE AFRICA

Starlink was strategically placed atop a school building to support the adult digital literacy program managed by Gonline Africa. This ensured seamless connectivity for over 600 elementary and secondary school students. It also serves as fallback community WiFi network, covering 300,000+ residents in the Kibera Slums.

ENTASOPIA

This Starlink system provided connectivity to nearly 2,000 villagers. Its community network reached an additional six small locales, each housing approximately 50 inhabitants, hence, connecting a total of 2,300 individuals. This configuration was primarily designed to serve the Maasai tribes residing in the area.

CAPACITY BUILDING

Help.NGO facilitated a specialized workshop on unmanned aerial systems (UAS) and cloud computing for representatives of the Kenya Red Cross Society, specifically from their IT, Innovation, and GIS divisions.

The curriculum encompassed both theoretical knowledge and practical applications, imparting vital drone operation skills to the attendees. Field training sessions were an integral part of this workshop, during which Help.NGO professionals introduced drone flight basics, demonstrated a variety of camera options - including thermal and zoom functionalities, and provided direct experience in efficient mapping through the use of DroneDeploy. This all-inclusive workshop was designed with the objective of augmenting the technical prowess of the Red Cross team. We will continue to support the Red Cross in their utilization of drone technology for enhanced disaster response and resource management in future humanitarian endeavors.

SUPPORTING PARTNERS

Help.NGO is dedicated to empowering local actors by supporting their response mechanisms and proposing technological resolutions that bolster their endeavors, thereby optimizing efficiency, expediting operations, and ensuring sustained impacts. Our partners play a pivotal role in magnifying the effects of various initiatives, particularly in times of crisis.

In the aftermath of the 2024 floods, Help.NGO extended support to the following organizations:

Internet Society

Kenya Red Cross

ICHA International Center for Humanitarian Affairs
At the Kenya Red Cross Society
• Inquire • Understand • Influence

GONLINE AFRICA

sdi. SLUM DWELLERS INTERNATIONAL

HOT Humanitarian OpenStreetMap Team

TECHNICAL IMPLEMENTING PARTNER

Help.NGO collaborated with Amazon Web Services (AWS) as its technical partner to respond to floods in Kenya in 2024. By leveraging AWS cloud computing, Help.NGO was able to process data more effectively, generating high-resolution maps and models of the affected areas in real time and greatly speeding up imagery processing. Portable devices were utilized to store extensive data in a mobile context, augmenting Help.NGO's capacity for quick and efficient disaster response. This collaboration ensured that vital information was rapidly accessible, aiding in the efficient allocation and deployment of resources, thereby amplifying the effectiveness of Help.NGO's humanitarian endeavors.

DISASTER RESPONSE aws

INTERNET SOCIETY (ISOC) FOUNDATION

Help.NGO has maintained a collaborative relationship with the Internet Society (ISOC) Foundation since 2020 and the COVID response. This partnership extends to the Kenya Chapter, where Help.NGO, in alliance with ISOC Kenya and Kijiji Yeetu, is committed to reducing the digital divide across Kenyan communities. This collaborative effort to provide internet access in rural areas is generating educational and business opportunities.

In the wake of the 2024 floods, ISOC Kenya devoted its resources to improving emergency communication channels for both the affected communities and responders, thereby enhancing crisis management capabilities.

Photo: ISOC Kenya Chapter
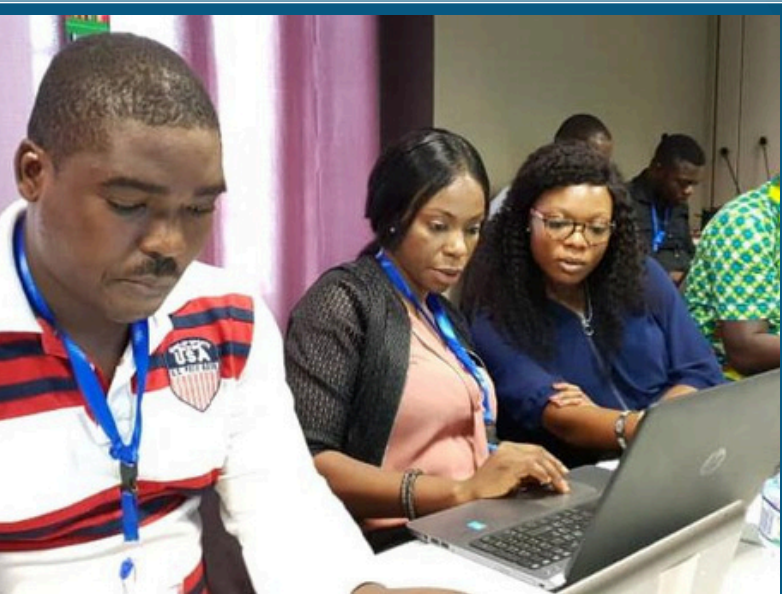
KENYA RED CROSS SOCIETY AND INTERNATIONAL CENTER FOR HUMANITARIAN AFFAIRS

Our collaboration with the Kenya Red Cross Society was pivotal in facilitating swift emergency responses and executing search and rescue operations. The Red Cross has been active in setting up displacement camps, pre-positioning shelter kits, and distributing essential supplies to support displaced households. Furthermore, they have undertaken risk communication initiatives to raise public awareness and enhance preparedness among affected communities. These proactive steps have played a significant role in reducing the impact of the floods on businesses, livestock, and inundated agricultural land.

Amidst this crisis, Help.NGO provided the Red Cross with crucial support in data collection and connectivity services. We also identified and implemented technological solutions for data processing and storage, utilizing resources like AWS Cloud (EC2, S3) and WebODM, and ensured the implementation of appropriate digital rights management solutions.

GONLINE AFRICA

Gonline Africa is committed to empowering individuals through digital literacy, affordable internet access, and valuable online resources in support of broader socio-economic development. In crisis situations, Gonline Africa prioritizes restoring infrastructure and comprehensive digital literacy programs to ensure marginalized populations can access vital information, effectively communicate, and utilize beneficial online services.

In response to the 2024 floods, Help.NGO and Gonline Africa collaborated to assess the situation and subsequently installed a LEO connectivity system in the Kibera Slums to service their school and computer literacy program.
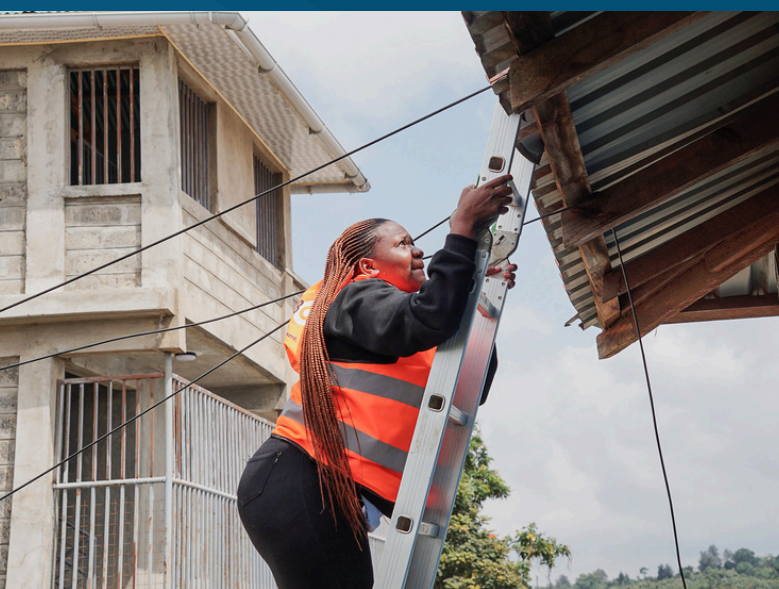
Photo credit: Gonline Africa

SLUM DWELLERS INTERNATIONAL (SDI)

Slum Dwellers International (SDI) is an expansive network of slum inhabitants, with national branches existing in over 18 countries spanning Africa, Asia, and Latin America. The organization's mission is to empower impoverished urban communities via grassroots organization and advocacy. SDI dedicates its efforts to enhancing living conditions in informal settlements by endorsing sustainable development practices, facilitating community-led initiatives, and advocating for inclusive urban policies.

In May 2024, Help.NGO bolstered these efforts by providing mapping data that covered approximately 12 square kilometers of the affected area. This data was utilized for damage assessment as well as for the planning of recovery and rehabilitation efforts.

All photos credit: SDI

HOTOSM SUPPORT

As part of Kenya's flood response, Help.NGO utilized drone technology to collect critical data. This was subsequently integrated into the Humanitarian OpenStreetMap Team (HOTOSM) to enhance OpenStreetMap (OSM).

HOTOSM is a platform where, when disasters strike anywhere in the world, thousands of volunteers mobilize both online and on the ground to create open map data. This open source-platform enables disaster responders to access key information about affected areas.
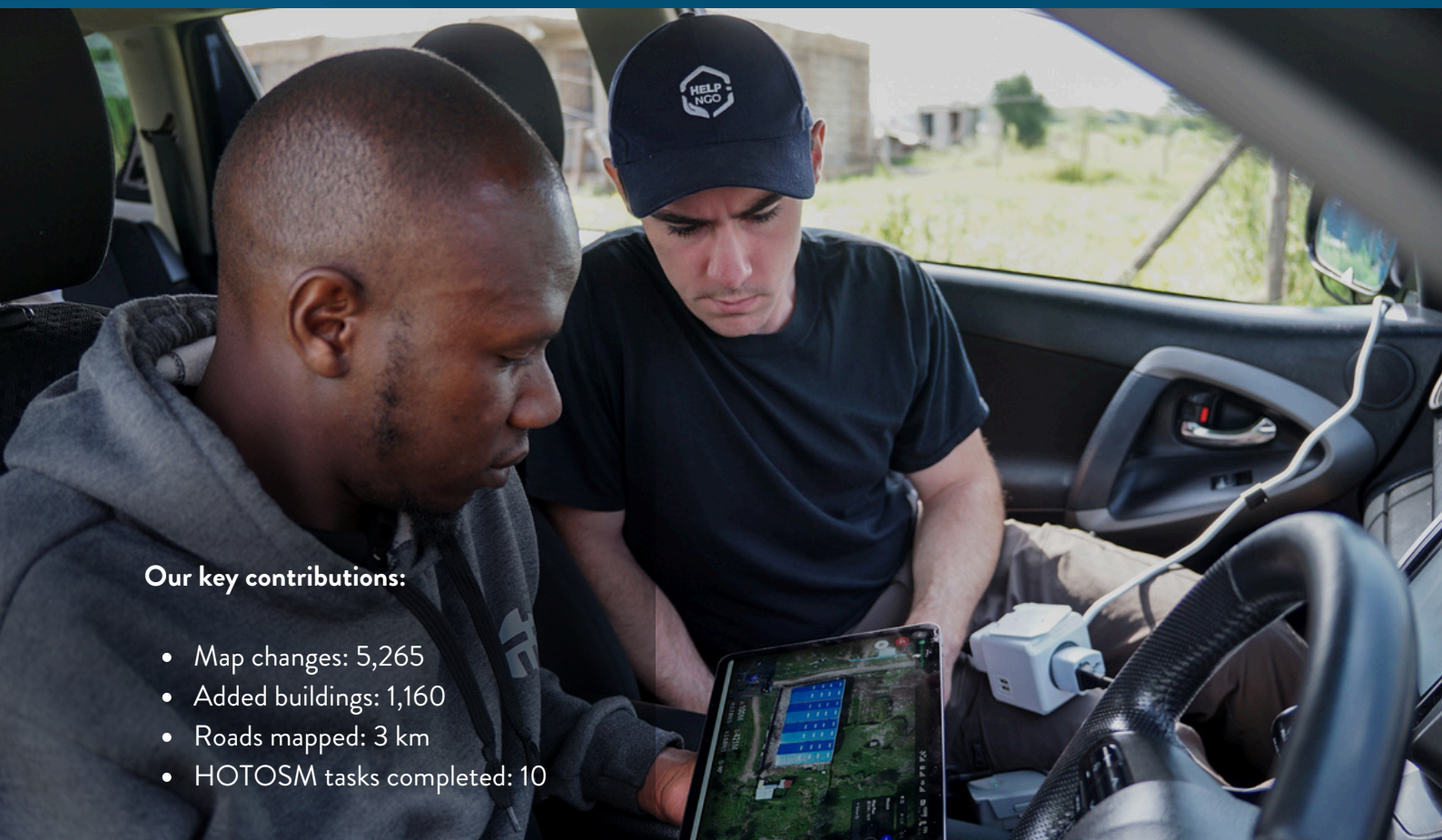
Our key contributions:

- Map changes: 5,265
- Added buildings: 1,160
- Roads mapped: 3 km
- HOTOSM tasks completed: 10

This effort was supported by AWS, which plays a significant role in backing HOTOSM initiatives. Our common data-driven approach ensures accurate and up-to-date mapping, significantly enhancing the efficiency of disaster response and recovery operations.

OUTCOMES

DATA SHARING

Help.NGO processed the gathered data and transferred the resultant outputs to Kenya Red Cross Society via their AWS account. This transfer amounted to over 100 GB of data covering 15 square kilometers of mapped areas. The data, which includes high-resolution maps and models, is integral to Red Cross Kenya's operations and strategic planning.

Help.NGO also showcased our Digital Rights Management (DRM) Solution, executed using Map Server on AWS in tandem with the HOTOSM Tasking Manager. This solution aided in planning the distribution of our aerial maps and satellite imagery, particularly in sensitive regions where data security is of utmost importance.

Data was also shared with Slum Dwellers International, and maps were uploaded to OpenAerialMap, in line with our commitment to Open Data and open-source solutions. This allowed researchers and other NGOs to use Help.NGO gathered data as an input in AI and machine learning models. T

CONNECTIVITY

Thanks to LEO satellite internet systems, Help.NGO worked to enhance the connectivity infrastructure in the impacted regions, bolstering educational initiatives, improving communication channels for local responders, and furnishing thousands of residents with crucial internet access. Through these endeavors, Help.NGO is working to bridge the digital divide and empower communities throughout Kenya.

CAPACITY BUILDING

We organized an intensive workshop for a group of seven individuals from the Kenya Red Cross Society. This programme incorporated both theoretical knowledge and practical applications within the realms of unmanned aerial systems (UAS) and cloud-based computing, with a strong emphasis on drone operations and mapping methodologies. The overarching objective of this initiative was to bolster their technical proficiencies, thereby facilitating improved disaster response mechanisms and more efficient resource management.

NEXT STEPS

The next steps for Help.NGO and local organizations in Kenya involve a multi-faceted approach to enhance disaster preparedness and response capabilities:

1 Help.NGO will concentrate on advancing the processing and distribution of data gathered throughout their operations in order to assist with analysis and informed decision-making. Specialists from Help.NGO remain in dialogue with the Field Operations team, the Data team, and the Emergency Response Coordination team from the Red Cross. These discussions aim to identify and establish the subsequent steps necessary to effectively incorporate this wealth of data into their existing workflows.

2 Local organizations, such as the Red Cross Kenya, will leverage collected data to revise and refine their strategies related to emergency readiness, relocation protocols, and intervention plans. This data will ensure a more effective and efficient response to emergency situations moving forward.

3 In response to a request from the Red Cross, Help.NGO will design and implement a comprehensive drone training program. This program will prioritize practical, hands-on experience, equipping participants with the necessary skills to operate drones effectively within humanitarian contexts. The aim is to enhance support for disaster response and recovery operations, thereby bolstering the overall effectiveness of these crucial efforts.

CONCLUSIONS

Help.NGO's deployment in response to the 2024 floods in Kenya significantly augmented local emergency response capabilities through sophisticated technical solutions and strategic partnerships. Expertise from a team of five subject matter professionals, including drone and connectivity specialists, was central to the successful mapping of 44.1 km² flood-impacted area and the collection of an impressive 286.5 GB of data. The strategic installation of eight Starlink units expanded connectivity to over 63,000 individuals across 13 counties, thereby enhancing communication channels for both responders and affected populations.

Notably, collaborations with the Kenya Red Cross Society, ICHA, the Internet Society, and Gonline Africa were instrumental in integrating technical solutions, such as Amazon Web Services (AWS) cloud computing and WebODM for data processing and flexible data storage. This concerted effort culminated in the creation of high-resolution maps and models, which became indispensable tools for effective disaster response and resource management.

Help.NGO's comprehensive approach, which encapsulated both capacity-building workshops and data-sharing initiatives, ensured local partners were well-prepared for future emergencies. As a result, the resilience and preparedness of Kenyan communities were significantly fortified, thus marking a milestone in disaster management efforts.

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