



February 17, 2018

TO: World Connect

FROM: Aaron Opdyke, PhD, PE (Disaster Risk Reduction and Management Program Officer, United States Peace Corps Response) and Daryl Daniel Bodo (Local Disaster Risk Reduction and Management Officer III, Municipal Disaster Risk Reduction and Management Office, Municipality of Carigara)

Mid-Grant Report – Participatory Hazard Mapping for Carigara

We would like to again thank World Connect for funding our project. Please find a short summary of the project accomplishments to date.

Overall, the project has been proceeding well with accomplishments of several major milestones. Notably, the project has been able to complete the primary grant activity – 8 participatory hazard mapping workshops. The team is now working to digitize maps drawn by community members which will be validated in the coming weeks and then printed and distributed.

Major Accomplishments

Hazard Mapping Workshops

All 49 barangays (communities) in the Municipality of Carigara successfully completed hazard mapping workshop activities that established flood, storm surge, and landslide hazard zones. In coordination with local Barangay Disaster Risk Reduction and Management Committees (BDRRMCs), 10 individuals from each barangay were invited to attend the workshops. Guidelines were set during invitations to ensure that attendance was gender-balanced and included youth, senior citizens, persons-with-disabilities (PWDs), and diverse sector representation. Each workshop spanned an entire day, commencing at 8am and ending at 5pm. In total, 427 individuals were able to participate in the 8 separate workshops. This number was slightly lower than the planned 490 individuals (10 per barangays). Despite not meeting the planned target number of participants, average attendance was nearly 9 individuals per barangay and workshops were effective in engaging diverse representation from communities.

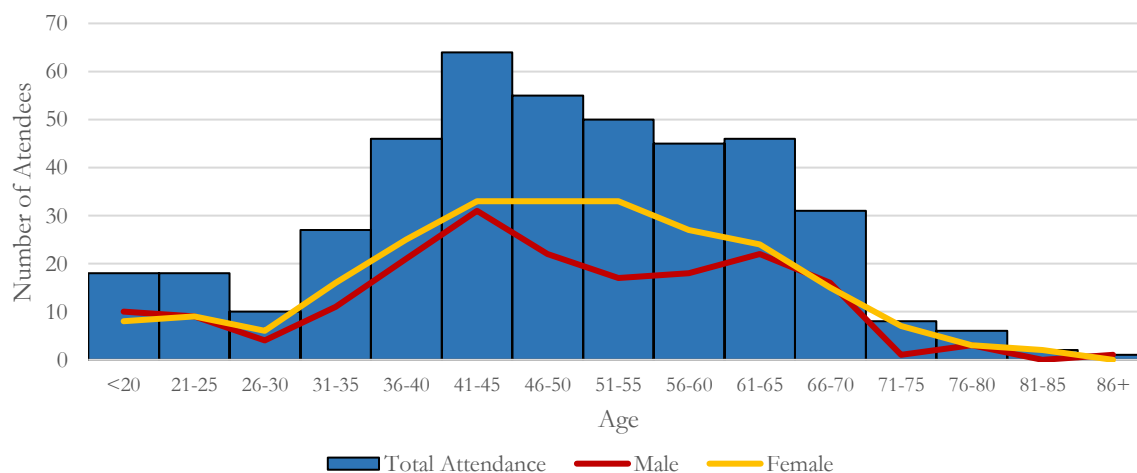


Figure 1: Hazard Mapping Workshop Age and Gender Distribution

Demographics of workshop participants included 43.6% male and 56.4% female. Notably, there was also a 7.3% attendance from PWDs, whose contributions added insights to discussions on the impact and location

of hazards within communities. There was also diversity in the age of participants, with 7.3% attendance from the 16 – 24 age group, and 22% attendance from over 60 years of age. Broadly, individuals self-identified representing sectors that included 41% general, 11% women and family, 10% livelihoods, 9% senior citizens, 8% youth, 7% health, 7% PWDs, 4% religious groups, and 3% BDRRMCs. A full breakdown of age demographics of workshop attendees can be found in Figure 1.

During the workshops, the Municipal Disaster Risk Reduction and Management Office (MDRRMO) provided a brief orientation to in-development base maps that were produced using OpenStreetMap (OSM). The morning activities were dedicated to map familiarization and edits, ensuring that houses, roads, land use (e.g. rice fields), and other infrastructure was appropriately mapped. During the afternoon, participants began reflections on historical hazard experiences while also using provided Philippines Department of Science and Technology (DOST) hazard maps (produced using Lidar and historical rainfall data) as well as the Philippines Mines and Geosciences Bureau hazard maps. Using these tools, acetate (translucent) paper was overlaid on printed base maps so that participants could draw high (1.5+ meters), medium (0.5 – 1.5 meters), low (0.2 – 0.5 meters), and unaffected (less than 0.2 meters) areas for flood and storm surge hazards. For landslides, communities were asked to identify high risk areas using similar scaling of high, medium, and low susceptibility. The number of hazard maps was determined by whether communities felt that a particular hazard was pertinent to their area. In most cases, communities drew a '5-year' and '100-year' flood map as well as either a storm surge or landslide hazard map. The '5-year' flood events were described regular flood events, whereas '100-year' floods were described in terms of a maximum event that might occur.

Map Digitizing

Next steps for the project will include the digitizing of hand drawn community hazard maps. This will allow for accurate replicable copies to be printed and shared as well as more advanced analysis to be conducted using GIS software. To date, two staff of the MDRRMO are receiving extensive training on OpenStreetMap mapping techniques as well as more advanced training on the use of QGIS software. No maps have yet been digitized as there are significant efforts currently underway to finalize base maps (with household numbering) to ensure that hazards maps, and particularly boundaries between hazard zones, are translated to the correct map locations when digitizing. It is expected that hazard map digitizing will start within in the next two weeks and be completed by the end of March on schedule.

Monitoring and Evaluation

In addition to mapping workshops and digitizing of maps, the project team has also been overseeing the distribution and collection of an extensive baseline survey for the project. Beginning prior to hazard mapping workshops, the MDRRMO distributed surveys to 2,743 households – a 20% sample of households in the Municipality of Carigara. This baseline survey has gathered data that will be used to assess the effectiveness of the project and assist in prioritizing future disaster risk reduction (DRR) programs. To date, 2,463 household surveys have received and encoded for analysis (an 88.4% response rate). 9.6% of received surveys were observed to be partially incomplete, however overall quality has been above expectations. The baseline data for the project matches planned efforts to obtain a household sample size of 2,300. A summary of baseline hazard awareness surveys are presented in Figure 2, Figure 3, and Figure 4,

Analysis showed that 2% of households stated they do not know how exposed their house is to flooding, while 21% of households were unaware of flood exposure beyond the area immediately in proximity to their house. Similarly, analysis showed that 13% and 12% of households do not know how exposed their house is to storm surge and landslides, respectively. 32% and 30% of households further stated that they did not have knowledge of storm surge and landslide hazard exposure, respectively, beyond the area in immediate proximity to their house. While most households do have awareness of hazards affecting their house, the baseline survey data show that there is a significant gap in understanding of how hazards affect areas beyond where families live. Given the geography of Carigara, this is important as barangays frequently become cut off during flood events as river crossings become impassable.

Of households that said they knew the hazard exposure of their home, 67% stated they are affected by flooding, 57% stated they are affected by storm surge, and 17% stated they are affected by landslides. As the project moves forward, the MDRRMOs plans to use geo-referenced households numbers to compare whether households stated the same hazard zone (high, medium, low, or not affected) as where they fall on developed hazard maps. This will allow for future prioritization of barangays for information and education campaign (IEC) efforts where there may be a mismatch in knowledge of hazard exposure and hazard maps.

Additionally, the project team distributed a survey to all Barangay Disaster Risk Reduction and Management Committees (BDRRMC) members to assess baseline trust in pre-existing hazard maps. In total, 779 surveys were collected which encompassed 45 barangays. Four of the barangays have been unresponsive in requests to submit surveys, however results encompass 92% of barangays and provide a sound foundation to assess changes in BDRRMC trust in hazard maps. Surprisingly, the team found that 83% of respondents agreed or strongly agreed that they trust existing hazard maps. To supplement the

planned final BDRRMC surveys at the completion of the project, the MDRRMO will also conduct a select number of interviews to learn how trust in maps potentially changed and reasons baseline trust was so high.

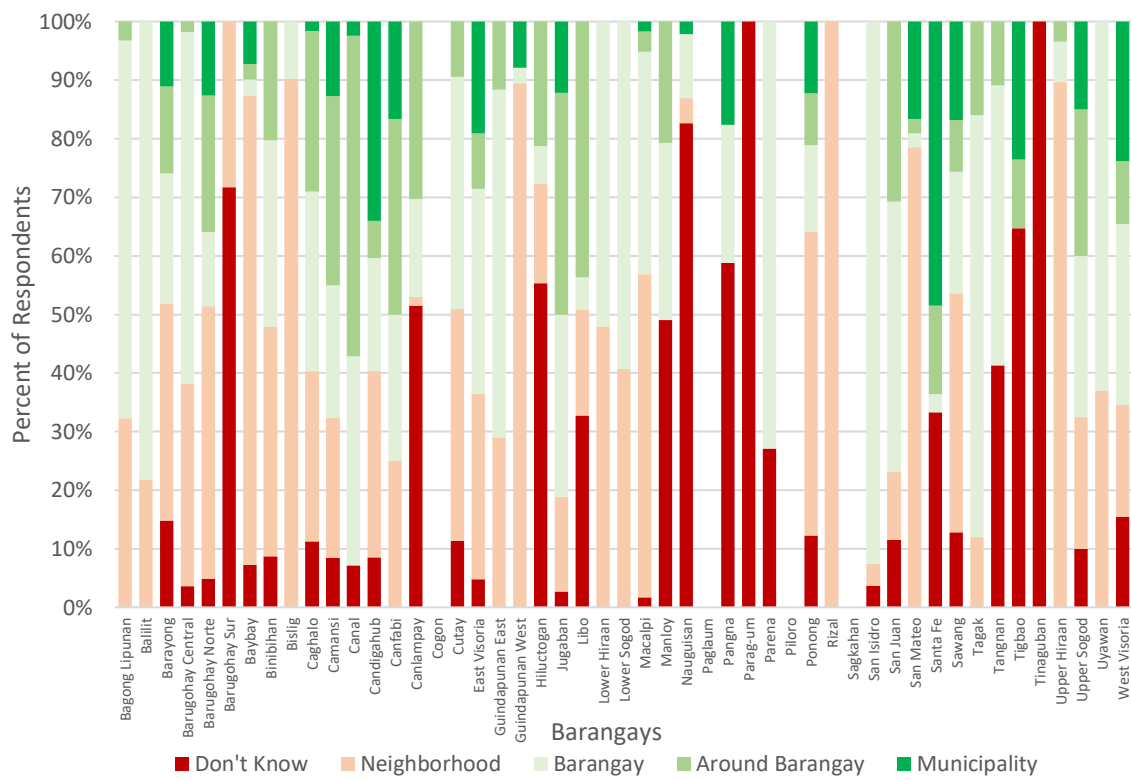


Figure 2: Barangay Awareness of Flood Hazards¹

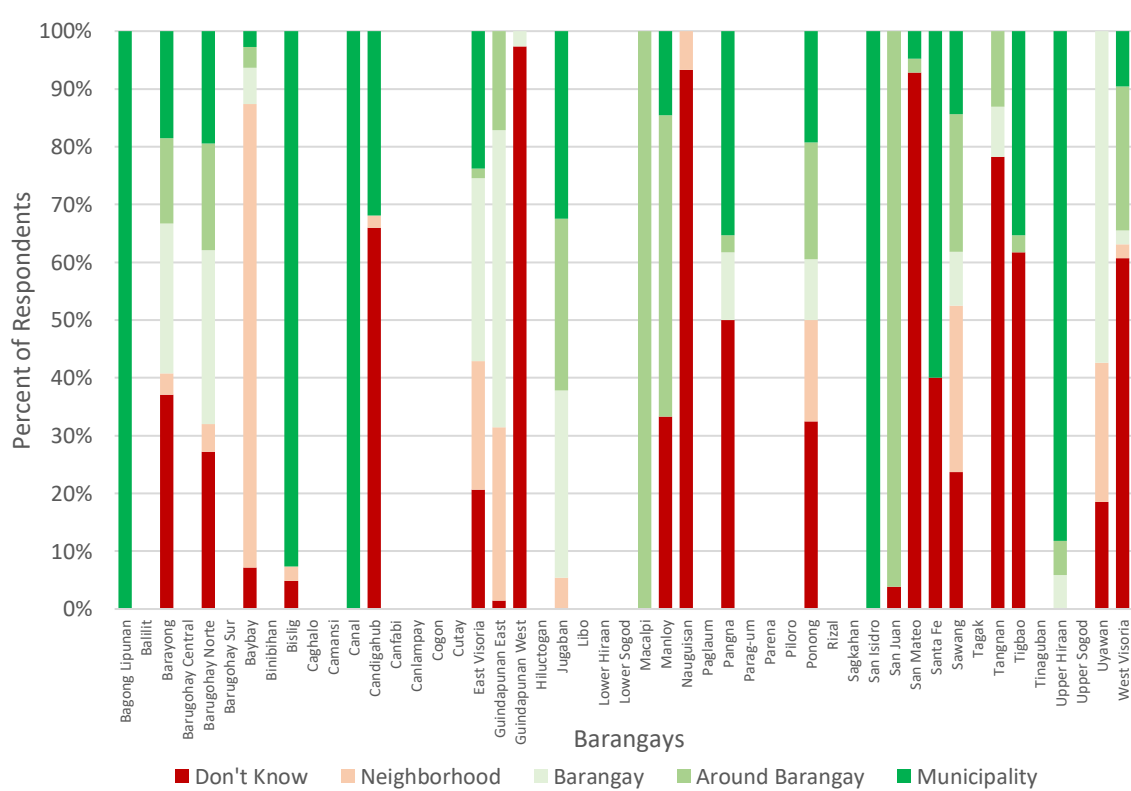


Figure 3: Barangay Awareness of Storm Surge Hazards¹

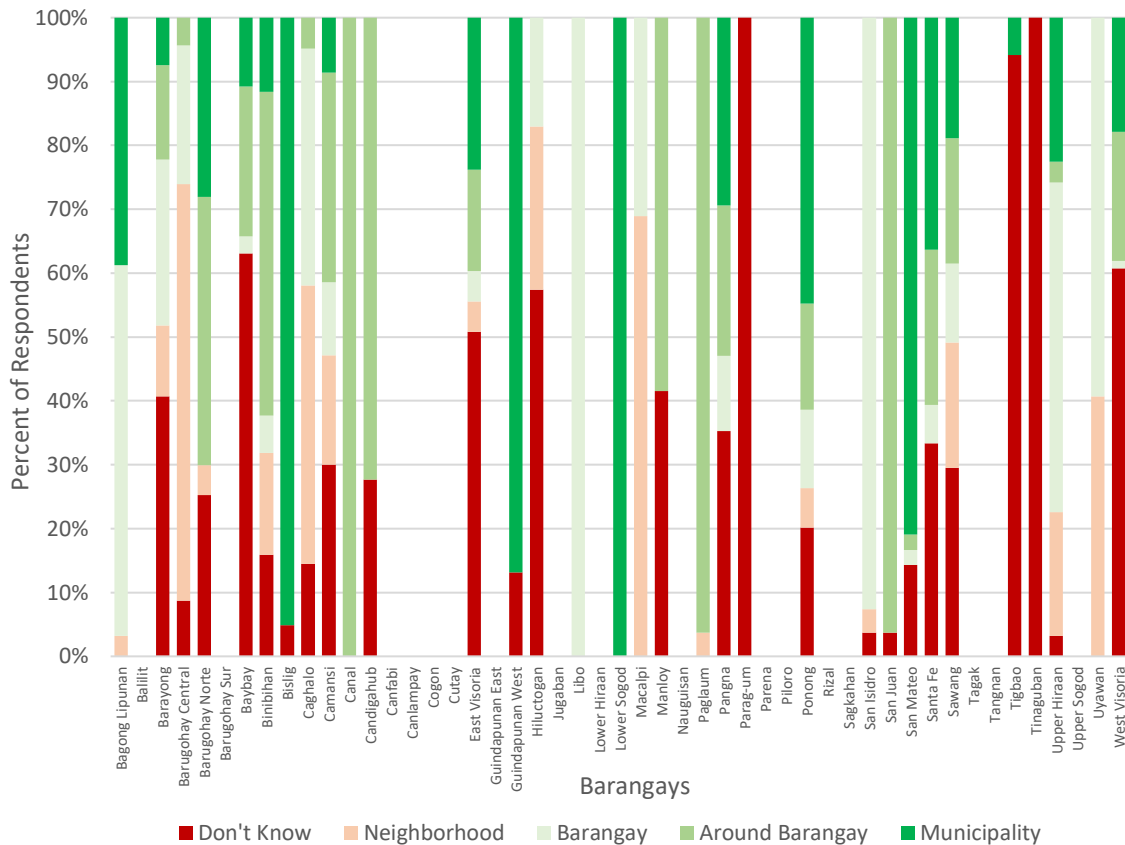


Figure 4: Barangay Awareness of Landslide Hazards¹

Community Engagement

So far, project engagement has been mostly limited to direct participants as communities become familiar with the project. There have however been several notable examples of stakeholders taking ownership of project activities. The Municipal Local Government Operations (MLGO) Officer formally endorsed the project and has assisted with expediting the collection of baseline survey data as well as promoting project engagement. He has actively promoted the project among barangay captains (locally elected leaders) and has openly spoke of the broad value of project activities.

Additionally, BDRRMCs have shown creative extensions of project activities after hazard mapping workshops. For example, following a recent tropical storm in January, one barangay voluntarily submitted a full household list with levels of flooding in order to verify their map produced during their workshop. The MDRRMO has worked to compile and leverage these contributions to enhance the verification of hazard maps which will occur concurrently with evacuation planning workshops in March.

It is expected that there will continue to signs of greater engagement in communities as the project enters into verifying hazard maps and distributing them. This last stage is expected to yield significant discussion and contributions from stakeholders beyond direct project participants.

Project Successes

The single most surprising aspect of the project to date is the speed at which the MDRRMO staff facilitating activities and communities have picked up mapping concepts. With relatively little effort, staff supporting the project have shown strong interest in taking lead roles. This included pre-workshop preparation, facilitation, and ongoing follow-up with communities. Project staffed showed their adaptability when issues arose and have demonstrated a strong ability to adopt the technology and mapping tools being employed. This includes

¹ Graphs display the highest level of stated hazard awareness by community members. For example, an answer of "neighborhood" would signify that a household was aware of hazard around their house, but not at the level of their barangay (community), neighboring barangays, or municipality. The lowest level of awareness was no knowledge while the highest was awareness of hazards across the municipality.

mapping software (OSM) and field GPS tagging. In many cases, there have been examples where staff have formed close relationships with community members through collaborative mapping efforts.

Another success of the project has been the ability of workshop activities to offer a platform to raise historical experiences of senior citizens. Experiences from senior citizens during workshops provided uniquely valuable during discussions of larger typhoons and floods which younger attendees had not experienced. During one batch, many attendees were skeptical that storm surge was a relevant hazard since they had not experienced it. Stories shared from several senior citizens shared light that not only was storm surge a relevant hazard, but that they had vivid memories of water levels reaching 3-4 meters in central areas of the municipality. The project team has noted that the maps being developed have captured this knowledge and institutionalized it for future generations.

As a sign of the early success of the project, one neighboring municipality has reached out to request a half day orientation to the tools and techniques being employed for the project in hopes of potentially replicating the project. The project team is planning to travel to present the project framework and discuss lessons learned in the coming two weeks.

Project Challenges

While the project has undoubtedly been popular with community members and is attracting positive attention, it has not been without challenges. The project itself is a work in process and continues to evolve as the project team facilitates inputs from team members and stakeholders. Every step requires collaboratively agreeing on actions and lots of brainstorming. This has consumed significant time ensuring that the process is truly participative rather than just top-down. This often conflicts with the aggressive schedule laid out. The project is also dependent on collaborations with 49 BDRRMCs which include 10-20 members on average. Managing and coordinating these efforts at times can seem daunting, especially where BDRRMCs lack capacity. The remaining grant tasks are in the hands of MDRRMO staff (digitizing of hazard maps), thus remaining activities are expected to be completed on schedule given the previously noted rapid acquisition of mapping technologies by staff.

There are however significant concerns that the project team will be able to collect the proposed end line monitoring and evaluation data. This stems primarily from a reliance on BDRRMCs and Barangay Health Workers (BHWs) to collect this data in timely manner. Discussions between the Project Leader and Established Field Partner have proposed eliminating the collection of household surveys at the project completion and delaying these until a later date after the grant close. Allowing more time for this survey collection is more feasible outside of grant constraints and will also better assess subsequent IEC activities planned to disseminate hazard map information in the coming year. In the initial grant proposal, a second round of 2,300 surveys was proposed – a proposed alternative is conducting a small number of focus groups and semi-structured interviews to assess changes in hazard awareness by project participants and communities. It is still anticipated that the robust survey data collected thus far can be used in the future and can also supplement proposed end-line focus groups and interviews. The collection of proposed BDRRMC surveys at the project close is still expected to be feasible.

Other challenges have included the need for the MDRRMO to manage evacuations and rescue operations during tropical storms that hit in December and January. This has strained staff available for the project and has created short term delays in activities. Despite these difficulties, these events added real time experiences for community members participating in hazard mapping workshops, further enhancing the relevance of the project.

Spending to Date

To date the project team has spent ₱213,837.20 (approximately \$4090.71 USD), or 85.8% of grant funds.

Testimonials

Field Partner Name: Aaron Opdyke

Field Partner Age: 27

Testimonial (Field Partner): With frequent typhoons, flooding, and earthquakes affecting the Municipality of Carigara, this mapping project is transforming the ability to institutionalize community knowledge and spatial awareness of hazards. The most exciting part has been seeing people connect, collaborate, and share ideas to create maps that they value. In many cases, we're seeing them go beyond what we've planned to take ownership of the process and plan for hazards.

Project Leader Name: Daryl Daniel Bodo

Project Leader Age: 33

Testimonial (Project Leader): For the past several years, we've been content in crafting disaster preparedness plans with mediocre basis. Before, we did not have credible household baseline data, an exposure database, or most importantly a vulnerability assessment. The Carigara hazard mapping project was designed and planned for us to address the aforementioned deficiencies. Understanding our hazards, exposure, and vulnerability is key to effectively planning and implementing our Climate Change Adaptation (CCA) and Disaster Risk Reduction and Management (DRRM) plans.

Participant #1 Name: Gloria Obana

Participant #1 Age: 55

Testimonial (Participant #1): As a barangay (community) in a coastal area, our vulnerability to calamities, especially typhoons, is a big trial for us. The seminars, orientations, trainings, and especially hazard maps of our barangay are a big help. It eases the burden for us as a Barangay Disaster Risk Reduction and Management Committee (BDRRMC). We called the household profiling and mapping "Madugong Labanan" (a hard fought battle), but because of our dedication and sincerity in helping others, saving lives, and protecting our barangay, through "bayanihan" (Filipino term for the spirit of communal unity, work, and cooperation to achieve a goal), community members and even youth are helping us. The thing to remember is that we are doing this to serve and save lives.

The Carigara hazard mapping project is really a big help not only for times of calamity, but also in daily barangay tasks. For example, the barangay profiling we completed provided us with updated and detailed household profiles that can be easily accessed. As we all know, we cannot stop calamities from coming but we can prevent and mitigate their impact.

Participant #2 Name: Nicky Arpon

Participant #2 Age: 29

Testimonial (Participant #2): The hazard mapping has helped our barangay in so many ways. It has helped us pinpoint vulnerable areas in our barangay. We are more familiar and knowledgeable now with flood prone areas. Although calamities are difficult to avoid, it is essential that we know our risks in order for us to strengthen our disaster preparedness. The technology used by the MDRRMO has been really helpful in expediting disaster risk reduction efforts. Through the project activities, we have gained knowledge that we will surely pass on to the residents of our barangay.

Participant #3 Name: Seferino Aballa

Participant #3 Age: 69

Testimonial (Participant #3): We have learned that hazard mapping can protect our barangay and its population. The project has helped ensure that people won't be put in a situation that will endanger their life or property and has encouraged us to learn about hazards that we are exposed to in our barangay. We are very much thankful that the hazard mapping was conducted here in Carigara for people to better learn about disaster risk.

We would like to again thank you for your support. Should you have any additional questions, please do not hesitate to contact us.

Sincerely,



Aaron Opdyke, PhD, PE
DRRM Program Officer
US Peace Corps Response



Daryl Daniel Bodo
Local DRRM Officer III
MDRRMO, Carigara

Attachments:
Hazard Mapping Workshop Schedule