

Advances in Earth and Environmental Science**Agricultural Sci-Tech Innovation Assistance for Food Security and Sustainability to Taal Volcano's Internally Displaced Population in Batangas**Venus O. Saz^{1*}, Romel U. Briones²

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Abstract

On 12 January 2020, the Department of Science and Technology's Philippine Institute of Volcanology and Seismology (PHIVOLCS) raised Alert Level from 1 to 4 (out of 5) after increasing activity of Taal Volcano in Batangas. The eruption has resulted in development challenges and problems such as increased poverty, limited livelihood opportunities faced by farmers which manifest the serious impact of the eruption on the ways of living and the livelihood activities. Thus, this project formulated in which a series of workshop and training skills were conducted to assess, develop and implement an action plan for rehabilitating the farm of the affected residents of Batangas, primarily at the municipality of Talisay, Balete, San Nicolas, Laurel, Agoncillo, and Ibaan. The participants were chosen by the Local Government Unit and composed mostly of members of 4P's and farmers. The beneficiaries were already in a difficult situation not only because of the recent eruption of Taal Volcano that rendered some of them homeless and unemployed but also because of the COVID-19 which aggravated the situation. Based on the initial assessment, it was found out that agricultural livelihood and property were heavily damaged by the eruption. Moreover, the said assessment led the project team to identify initial livelihood training's that can be introduced to the affected communities. These trainings' included household opportunities through vegetable production, processing and organic concoction production to rehabilitate the soil from acidity due to sulfur deposition during volcanic eruption. Rehabilitation and recovery plan were also considered to capacitate the farmers.

Keywords: Rehabilitation, Assessment, Livelihood, Eruption, Poverty.

Introduction

On January 12, 2020, Taal volcano erupted and has affected 151,386 families comprising of 584,236 individuals across the province of Batangas, Quezon, Laguna, and Cavite. Of these, 1,813 families consisting of 6,666 individuals were evacuated to temporary shelters during the onslaught of the disaster. On February 14, 2020, Taal Volcano alert status was lowered by PhiVOLCS to alert level 2 which signaled the cautious return of the people to their homes. However, there are municipalities in Batangas under total or permanent lockdown such as Laurel, Balete, Talisay, Agoncillo and San Nicholas considered as heavily damaged and with high risks.

Residents from areas under lockdown remain in the temporary shelters being provided by LGUs and by the National Government. Due to a continuous lockdown, there's an increase of Internally Displaced Population (IDP) of 6,610 families comprising of 24,197 individuals (DSWD, 2020). Internally displaced population was distributed into several temporary shelters. The eruption has resulted in development challenges and problems such as increased poverty, limited

livelihood opportunities faced by farmers which manifest the serious impact of the eruption on the ways of living and the livelihood activities.

To sustain food sufficiency of the displaced individuals, crop production in the affected areas is an economically very important activity. This is a key source of essential nutrition and play a crucial role in healthy diets. However, people are facing uncertain and difficult times in the face of the Taal Volcano eruption and COVID -19 pandemic. These are impacting global food systems, disrupting regional agricultural value chains, and posing risks to household food security. Since, households have less income to buy increasingly expensive food, transporting food has become more time-consuming and costlier, farm inputs remain scarce and vital agro-chemicals are delayed in ports and at customs checkpoints hence, the said municipalities need adoption of technological solutions particularly on vegetable production to reduce the reliance on food imports and at the same time can be a source of livelihood.

The benefits of plants in this period of forced isolation and being displaced in the community can be of key importance to keep bodies and minds active and fed especially more people have to self-isolate in urban and suburban environments. In this challenging time, a vegetable gardening in home spaces can bring recreational, health, economic and environmental benefits. Regardless of the challenges, there is untapped potential for this kind of garden to impact environmental outcomes, public awareness, and market trends. Home vegetable gardens could provide a small-scale approach to the sustainable use of natural resources, leading towards self-sufficiency, self-regulation, economic and food sustainability and environmental protection (Bratman et al., 2015).

According to Philippine Statistics Authority (2020) reported that the crop production including vegetables has decreased due to Taal volcanic eruption. This leads the increase of human interests on vegetable production to sustain their needs and also economic purposes (Yu, 2020). The challenges of increasing vegetable productivity against the effect of Taal volcanic eruption leads to diminishing soil fertility and natural resources particularly land and water together with the rising cost of vegetable production call for greater technology support. Classification of different vegetable crops, basic principles of different crop management practices, seedling management, water management, soil-plant nutrient management, pollination management, IPM techniques or integrated disease management and modern production technologies of important vegetable crops are necessary to impart (Hazara et al., 2011). Thus, this project formulated a series of workshop and training skills to assess, conduct, develop and implement an action plan for rehabilitating the farm of the affected residents of Batangas, primarily at the municipality of Talisay, Balete, San Nicolas, Laurel, and Agoncillo.

Objectives

Generally the project aimed to contribute to the concerted government efforts to alleviate the condition of the internally displaced populations of Taal Volcano eruption through inter-agency collaborative efforts and S&T-based recovery operation.

Specifically, the project aimed the following objectives

1. To conduct an on-site assessment of the eruption damage specifically on agriculture sector and possible S&T-based recovery interventions.
2. To assess the effects of Taal Volcano eruption among the selected internally displaced population.
3. To address the immediate needs of the internally displaced population in heavily affected areas.
4. To formulate policy recommendations on the recovery program for the internally displaced population of the Taal volcano eruption.

Methodology

Rapid site assessment and profiling of internally displaced population from the heavily damaged areas of the Taal Volcano Eruption was conducted.

- The team conducted extensive reconnaissance surveys and site documentation of the permanent damages on crops, and livestock on the five hardest hit municipalities (Talisay Laurel, Agoncillo, San Nicolas and Balete). Key informant interviews such as focus group discussion (FGD) using structured questionnaire, photo and video documentation were done during the site assessment. The assistance of the Municipal Agriculture Office (MAO) was coordinated during the series of activities.
- Internally displaced population in the evacuation centers were profiled and assessed using FGD with the aid of structured questionnaires. Among the information included in the profiling were the extent of damages on their property and livelihood. At least 39% or 2,600 of the IDP's were identified as respondents and beneficiaries for the project. Selection of respondents and beneficiaries were based on the following criteria:
 - a) Primary target families were residents of areas under permanent and total lock down.
 - b) Families outside areas under permanent and total lock down but under poverty threshold.
 - c) Families outside areas under permanent and total lock down but with subsistence livelihood.
 - d) Families outside areas under permanent and total lock down but with more than 50% agricultural damage on livelihood.
- To guide the project team and to ensure that the processes being undertaken were in the right track, a benchmarking activity in the province of Albay with similar disaster rehabilitation experiences were conducted. The activity aimed to benchmark the best practices in disaster risk rehabilitation and restoration for disastrous volcanic eruption. Specifically, the management plan, damage assessment and recovery strategies, useful technologies to restore and rehabilitation of the affected areas of volcanic eruptions were documented. Offices of the Legazpi City Disaster Risk Reduction & Management Office and Albay Provincial Disaster Risk Reduction and Management Office were visited.
- The priority beneficiaries of the relief operation were the displaced population from areas under total and permanent lockdown across the five heavily damaged municipalities. The Office of the Municipal Social Welfare and Development of these municipalities were tapped in identifying and locating the 2,600 target family recipients.
- Procurement of food products developed under DOST programs and projects were the primary components of the relief packages. Staging and sorting facilities were done in BatStateU Pablo Borbon Main Campus I under the Social Innovation and Research Center (BatStateU SIRC). A report of the relief operation was prepared and submitted to DOST PCAARRD and BatStateU as an integral component of the progress report.
- Livelihood training's were conducted based on the initial assessment and profiling of the identified beneficiaries. There were five training sessions with different topics to provide additional livelihood opportunities to internally displaced families relocated in temporary shelters. Each

session have maximum of thirty (30) participants. Among the possible training topics were composting, container gardening, urban agriculture and soil liming.

- Identification of potential S&T-based recovery interventions – The gathered data were organized and analyzed using statistical software (SPSS) and was interpreted to come up with a more conclusive suggestions and recommendations. The result can be used as a basis to craft programs and projects to contribute to the rehabilitation and restoration particularly on the agricultural and aquatic livelihood of the community. Indigenous knowledge of the community was also considered in finalizing the recommendations.
- The project commenced after the MOA was signed between DOST PCAARRD and BatState-U. The project fund was downloaded to BatState-U and followed the regular government accounting and auditing rules and regulations in financial management and disbursing funds. Collaboration and partnership with Cavite State University (CavSU) was established through Memorandum of Agreement to assess the damages on high-value crops and agri-training and rehabilitation respectively. One project support staff from the office of Municipal Social Welfare Development Office and Municipal Agriculture Office

of the five identified municipalities were also tapped as part of the project. They would help in identifying and locating the target families to be assessed and recipients of the relief efforts. A Memorandum of Understanding (MOU) was instituted for these purposes. Relief goods were procured from DOST-FNRI, CLSU and other agencies with relevant products. The project teams were monitored the implementation and progress of the project. A monthly progress report was prepared and submitted by the project leader both to DOST- PCAARRD, Batangas State University and Cavite State University

Results and Discussion

Implementing Mechanisms Adopted: Planning meeting/ Inception meeting

Careful planning is essential for the success of any project and activity. This is very true for the Bangon Batangas Project as the project team with its members are relatively new to a project funded by DOST PCAARRD. To guide the team in implementation, an inception meeting was organized by TTPD of DOST PCAARRD. This was attended by various project teams and their corresponding administrative officials, particularly from the finance division.



Figure 1: Inception meeting of the project

Onboarding of local government units in planning and implementation

The cooperation and support of the local government units (LGUs) at the municipal and barangay levels are crucial for the success of the project. Courtesy meetings and project presentations were done with the goal of onboarding the LGU's on the project implementation. Series of virtual meetings to present and discuss plans for IDP profiling, livelihood training workshops, and relief distribution were done. The project also constantly communicates with the ground through the designated focal persons of the LGUs to ensure safety.



Figure 2: The Bangon Batangas Project was introduced and presented to LGUs to solicit support and to onboard them on the goal and activities of the project (in photo: Meeting with Hon. Joan Lumbres- Amo, the municipal mayor of Laurel Batangas).

Initial Assessment

An initial assessment was conducted by the researchers in the towns of Agoncillo, San Nicolas, Balete, Laurel and Talisay on February 20-21, 2020 to determine the extent of damage in terms of agricultural sector. Key informant interviews among selected staff of LGUs consist of Municipal Agriculturist, Municipal Chief Executive, Municipal Planning and Engineering Office and Municipal Social Welfare and Development Office were conducted using an semi-structured interviews.

Based on the initial assessment and profiling, it was found out that livelihood and properties particularly of those municipalities with barangay's in the Volcano Island were heavily damaged by the eruption of Taal. Since most of the residents were into farming, fishing, and livestock raising prior to eruption, affected people are now looking for other livelihood options that they can possibly start with so as not to depend heavily on the relief goods and other assistance and support of donors. From the accounts of selected locals and

LGU officials, it was determined that affected people including those who now safely back to their communities, as well as those who are now housed in the interim housing facility of Provincial Government would still want to pursue farming. They still want to plant vegetables and other high-value crops. Other town officials would like their residents to also try other livelihood technology since they are not yet sure as to when they can start utilizing farming lands in their area.

Moreover, the said interview and preliminary assessment led the project team members to identify initial livelihood trainings that can be introduced to the affected communities. These training includes but not limited to urban gardening, aquaponics, container gardening, composting, application of lime material, food processing, financial management and record-keeping. Another notable finding of the initial assessment is that the Municipality of Agoncillo sustained heavy damage due to prolong and heavy ashfall. Selected residents as well as LGU unit particularly the Municipal Social Welfare and Development Office (MSWDO) mentioned the need for augmentation of relief and assistance on livelihood.



Figure 3: Relief assistance to the IDPs of Taal Volcano eruption under the DOST PCAARRD funded project Bangon Batangas: S&T based assistance to Taal internally displaced population.

A total of 11 barangays are classified as permanent danger zone within the five (5) hardest-hit municipalities of the eruption. The total number of beneficiaries is 99 shorter than the original target. Such adjustment was due to the price increase of some of the relief components. Such adjustment was communicated to the target communities.



Figure 4: Distribution of relief assistance to the Taal IDPs of Brgy. San Isidro, Talisay Batangas.

Livelihood trainings for IDPs

From the rapid profiling and focus group discussions conducted, several livelihood trainings were identified and conducted to assist selected IDPs in their livelihood recovery. Among the topics that are covered are crop production, formulation and production of liquid fertilizer and soil liming. A total of 209 participants participated in the training.



Figure 5: Participants of the livelihood training

Damage Assessment Report

Damage reports on agriculture were gathered and consolidated from the five (5) LGUs. The data were summarized and analyzed to draw information on what areas are to be prioritized in the profiling and livelihood training. This information was also paired and validated with the results of the focus group discussions (FGD's) conducted with the barangay leaders and people organizations (PO's).



Figure 6: Damages of the January 2020 eruption are still evident along with continuous risks of sinkhole formations and ashfall deposits.

Livelihood Recovery Plan

One of the important outputs of the project is to propose a livelihood recovery plan and recommendation based on the FGDs with key individuals, profiling of IDPs, and benchmarking on best practices to rehabilitate livelihood in areas devastated by a volcanic eruption in the country. It is hoped that recommendations and some of the plans can be utilized even at the local level to aid livelihood recovery.

Training/Technology Clinics/business Matching Conducted

Bangon Batangas: S&T-based assistance to Taal Volcano's Internally Displaced Population is a series of workshop activities aimed to help the residents of Batangas, primarily at the Barangays of Talisay, Balete, San Nicolas, Laurel, Agoncillo, and Ibaan, learn livelihood skills and earn extra income. The initial part of the series was needs assessment activities. The initial assessment conducted determined the extent of damages in terms of agricultural sector. It also aimed to identify initial livelihood pieces of training that can be introduced to the affected communities. Based on this profiling and focus group discussions (FGDs), there are feasible livelihood opportunities including vegetable production, organic concoction making and processing. The participants of this training are IDPs that were chosen by the Barangay Local Government and composed mostly of members of 4P's, fisherfolks, and farmers.



Figure 7: Participants of the training amidst of the pandemic.

Training on high-value crops production and organic fertilizer production

Crops production was severely affected by the eruption due to ash deposits on the farmland of the IDPs. This is evident both on the site assessment and from the result of FGDs and IDP profiling. Hence, the project included on the lists of livelihood training workshops the complementary topics on soil amelioration and crop production. Aside from the training, seeds, fertilizers, mollases and other starting materials for formulation of organic fertilizers were provided to the farmers. These pieces of training rendered were evaluated very well by the participants and found to be useful to augment the daily needs in terms of food and possible viable source of income.

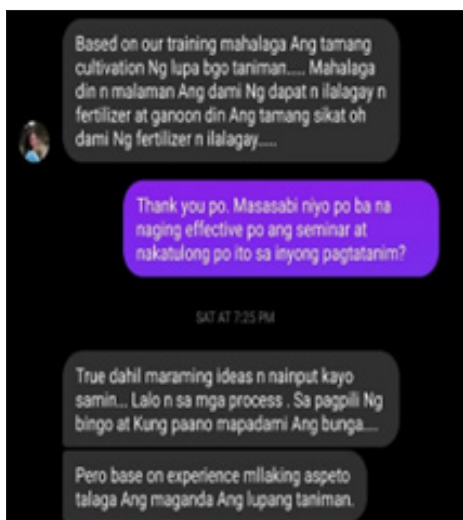


Figure 8: The farmers belonging to IDPs post photos after receiving the kit containing seeds, organic fertilizer, and IECs.

Participants' Feedback

The training workshops conducted proved very effective as the trainees/participants constantly posted their progress reports in the official facebook group dedicated to monitoring the growth of their seeds. Marivic Tabelisma, a farmer from Laurel, thanked the facilitators as she showed the fruits of her planting 2 months later. She also explained that the seeds from the crops she harvested will be enough to sustain another batch that she was planning to plant. She added that what she learned most important during the training was soil cultivation and rehabilitation by lime application that makes the soil productive. After cultivating the

soil, she produced crops faster than she was expecting. Marivic Tabelisma said “I learned that an important aspect of planting was soil cultivation and rehabilitation and proper application of fertilizer and lime which gave my seeds faster growth”. After just 2 months, Marivic and the rest of the farmers from Laurel have already started planting the seeds they’ve harvested from the first yield.



“Snippet of conversation”

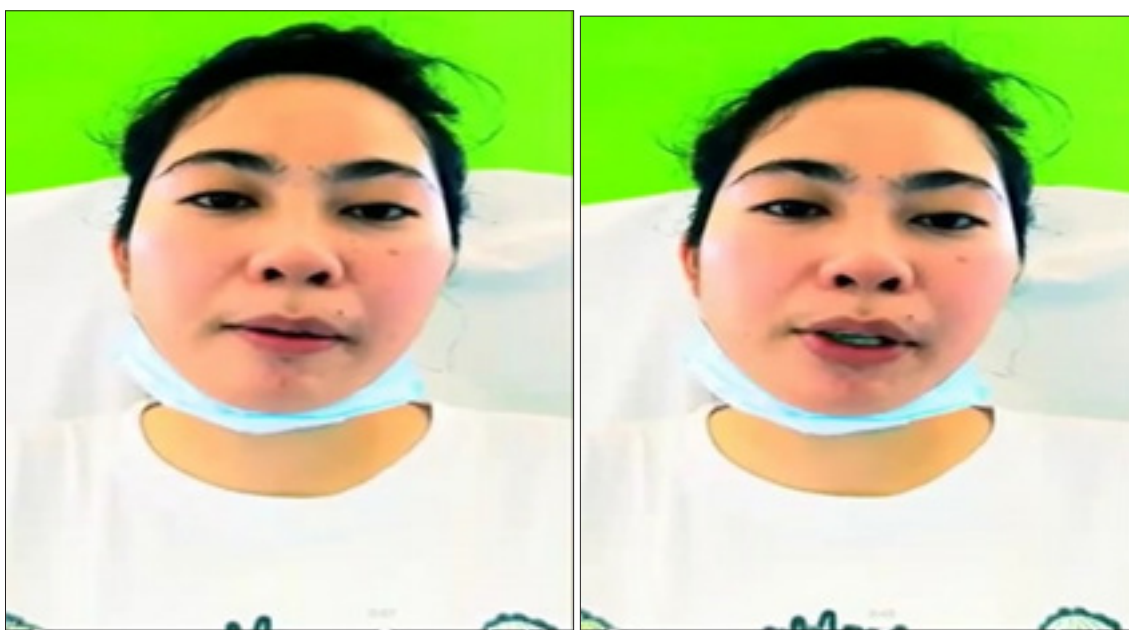


“Official Facebook group”



“Ms. Tabelisma’s first yield”

Ms. Ara Agojo, one of the focal persons of Laurel, said it was a great experience to be part of Bangon Batangas and that she was really happy to see the farmers of Laurel be able to plant with the same vigor they once had before the eruption. She explained that it took a while before they were able to plant again because of the volcano’s heat rendering the soil implantable.



“Video Testimony of Ms. Ara Agojo”

Nemesio Ocampo, a Barangay Health Worker and farmer for over 30 years, was surprised to learn that letting the soil be basked in sunlight before planting seeds would increase germination rate. He said that they have not heard of soil solarization before they watched the video prepared by the facilitators. He explained that Balete farmers find difficulty in competing with farmers from different areas because they were mountain farmers. He gave out hope that through soil solarization, lime application, application of organic concoction and less dosage of synthetic fertilizer applied gave him a bigger profit than they had before thus, the hands on training seminar is very important knowledge in increasing farm productivity.



“Video Testimony of Mr. Nemesio Ocampo”

Conclusions and Recommendations

The Taal Volcano eruption has displaced the adjacent communities. This has greatly affected their livelihood and ways of living. Agricultural livelihood is the most heavily damaged industry. This has increase the poverty and unemployment to the IDPs as most of the livelihood are based on this sector. Both site assessment and profiling documented persisting damages in agricultural livelihood of the IDPs. Furthermore, the COVID 19 pandemic has add more livelihood challenges due to health risks, negative economic impacts, and social restrictions. The profiling of more than 2300 IPDs reveals that majority of IDPs engage in fishery, aquaculture, livestock, and crops production. Livelihood assistance is still inadequate according to IDPs. Awareness on fishery policies and on available opportunities and assistance from the government is low. However, despite of all challenges they encountered, IDPs are remains open to leaning of new livelihood skills.

This information was important basis during the conduct of activities of the project. Five trainings on crops production, soil amelioration, and fish processing were conducted as a viable alternative livelihood for the IDP communities. Thirteen units of smokehouse were also donated to people organization to support their start-up livelihood on smoke fish processing. Moreover, more than 2500 IDP families were assisted through relief assistance using products develop under DOST funded research projects. Based on the monitoring, the IDPs are grateful for the project. They started the smoke fish and vegetable production. The Extension Services Office (ESO) of BatStateU will implement the monitoring and evaluation together along with supplemental extension projects to ensure sustainability.

Based on the profiling, benchmarking, and FGDs, the rehabilitation and recovery programs must focus on building-up of existing skills and locally available resources This will ensure immediate social acceptance and sustainability. Furthermore, it is imperative approaches must be towards building back more resilient livelihood, and capacitating of residents to new skills.

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