European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 3 No. 2, February 2022,
ISSN: 2660-5643

DEVASTATING EFFECT OF NATURAL CALAMITY ON THE PRODUCTIVITY AND INCOME OF SUGARCANE FARMERS AT EASTERN VISAYAS, PHILIPPINES: AN EXPERIENCE

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Article history:
Received: December 10th 2021
Accepted: January 11th 2022
Published: February 24th 2022

Abstract:
The Philippines as an archipelago is one of the most vulnerable countries in the world to natural disasters and looming climate change. Eastern Visayas, which were devastated heavily by Super Typhoon "Haiyan" last November 23, 2013, is being tagged as one highly vulnerable area to all kinds of natural calamities.
One of the farm crops directly destroyed when natural calamities occurred in this area is sugarcane. However, statistics related to losses are seldom can be found. Hence, this study aims to determine the impact of natural calamities in terms of losses to sugar production and income of the farmers.
The existing "Crop Damage Survey Instrument" was used in gathering data after the occurrence of every calamity. Most of the data was gathered in the 154 samples farms strategically located in the nine municipalities and one city with sugarcane crops. The data gathered were encoded in the excel format and analysis was done using the SPSS software.
For the years 2017 to 2018, the year 2020 five calamities had occurred thus it was described as "often". In the years 2017 and 2021 the area damage was large hence it was described as "very highly damaged" In terms of losses in sugar and income the year 2017 was described as "very high losses"
Another or more studies should be conducted related to this subject in order to contribute on the knowledge related to this subject matter.

Keywords: Natural Calamity, Productivity Loss, Income Loss, Sugarcane Farmers

1.INTRODUCTION

1.1. Background

The Philippines as an archipelago is one of the most vulnerable countries in the world to natural disasters and looming climate change. Over 7,000 plus islands, and about 40,000 kilometers of coastline, nearly every one of the population are vulnerable to disaster. The intensity of a tropical cyclone is determined by the strength of the surface winds near the center. This type of hazard can be predicted using modern radars and mathematical models to establish the possible tracks and the radius of influence. With this information, pre-typhoon damage will be possible to account for the risk of yield loss and make decisions in advance.

Relatively Eastern Visayas Region is one of the areas in the Philippines, which is tag as highly vulnerable to all kinds of natural calamity. Flashing back on the time when Super-Typhoon "Yolanda" (Haiyan) devastated the area last November 8, 2013. The estimated damage was Php 2,326,515,000 for the above-mentioned Region alone, out of the total damaged of Php 8,445,678,576.15 for the 4 regions in the Visayas.

Specifically for sugarcane crops, the damage was 100% of the total area planted of 6,800 hectares. Estimated losses for production was 435,000 LKG (1 LKG = 1 {50}-kilo bag) with a calculated amount of USD 12,510,000 [4].

Three and a-half-year after ST Yolanda hit the country, the 6.5 magnitude earthquake shakes also the area of Eastern Visayas last July 6, 2017, at around 4:03 PM [4]. It is normal because the Philippine archipelago represents a complex system of microplates that are being compressed between two convergent plate margins that bound the country, which is the Philippine Sea to the east, and Eurasian plates to the west. Between the convergent subduction zones, oblique tectonic motion is accommodated by numerous crustal faults that traverse the archipelago; in particular, the 1,600 km-long Philippine Fault Zone, which runs from northern Luzon in the north through to the island of Mindanao in the southern Philippines.

Table 1 shows that for the years 2017 to 2021 there were 13 typhoons and one earthquake that directly hit the Eastern Visayas. The table also indicated the date of occurrence. The most number of typhoons occurred last 2020 with five and for 2021, only one had occurred.

Table 1. Name of calamities and date of occurrence.

Calamity/ Name of Typhoon	Date of Occurrence
2017	
Earthquake	July 07, 2017
Cresing	Apr. 16, 2017
Urduja	Dec. 16, 2017
2018	
Basyang	Feb. 13, 2018
Ompong	Sept. 15, 2018
2019	
Falcon	July 22, 2019
Tisoy	Nov. 3, 2019
Ursula	Dec. 25, 2019
2020	
Ambo	May 15, 2020
Leon	Sept. 16, 2020
Quinta	Oct. 25, 2020
Rolly	Nov. 1, 2020
Vicky	Dec. 19, 2020
2021	
Odette	Dec. 16, 2021

1.2. Objectives

1.2.1 The general objective of the study is to determine the impact of natural calamities that hit the area of Eastern Visayas, the Philippines on sugar production and the amount of losses.

1.2.2 Specific objectives

1.2.1.a. Determine the level of frequency of occurrence of natural destruction

1.2.1.b. Determine the level of the area affected

1.2.1.c. Determine the losses in sugar production and the corresponding amount of loss

1.3. Statement of the Problem

The sugarcane industry is one of the major dollar income industries in the Philippines. On the other hand, the area of Eastern Visayas is one the most prone area to natural calamities in the Philippines. This study aims to review the devastating effect of natural calamities that hit Eastern Visayas, the Philippines for the years 2017 to 2021 in terms of productivity and income:

2. MATERIALS AND METHODS

2.1. Research Method

The majority of the primary data were retrieved from the data bank prepared and kept by the author. The descriptive correlational study was used in this study. It focused on the occurrence of natural calamities that hit the areas of Eastern Visayas in the Philippines and its' corresponding losses in terms of production and monetary value for the period 2017 to 2021,

2.2. Research Environment

The study was conducted in the 9 municipalities and a city at Southern Leyte, Eastern Visayas Region, Philippines. Specifically, the study covered the municipalities of Albuera, Capoocan, Kananga, Leyte, Matag-ob, Merida, Palompon, Tabango, Villaba and the City of Ormoc.

2.3. Respondents

The respondents of the study were the sugarcane farmers included on the prepared sample farm per farm size and per barangay, which were randomly determined. Employing the Slovins formula, 154 sugarcane farmers from the 9 municipalities and 1 city were included. Additional respondents were the planter's association, cooperatives, sugar mill, and other areas greatly affected by every natural calamity

2.4. Research Instrument

The existing "Crop Damage Assessment" instrument to determine the crop damage brought by any calamities, which was designed by Hombrebueno (nd) was utilized during the gathering of data. This reference was the basis in estimating the damage assessment including the monetary value. Currently, the template is in excel format for ease of computation. Reflected on the template is the form of damage/crop injury and the corresponding yield loss per crop age.

The template requires two important input data to come up with the monetary value of the damage, the area of sugarcane affected, and the corresponding crop age. To estimate the area, the conduct of an actual field assessment survey is done at least two days after each occurrence if conditions permit. Thereafter, assessing the extent of damage, taking into account the type of crop injury per crop age. Then, the collected data were encoded on the prescribed template to come up with a standard computation of the damage.

The group of Hombrebueno had already determined the reliability and accuracy of the survey instrument. The instrument is now widely accepted for this kind of survey.

2.5. Data Gathering Procedure

The researcher had personally administered the gathering of data for the period 2017 to 2020 with the assistance of the government agency Technical Personnel/Junior Agriculturist at Eastern Visayas area of the Philippines. Upon retrieval of the primary data from data bank and reports, the researcher had analyzed the data using the Statistical Package for Social Sciences (SPSS) software under the closed supervision and guidance of the statistician. Subsequently, tables were prepared for easier interpretation.

2.6. Statistical Tool

In the analysis of data, the following statistical tools were used in accordance with the nature of the specific problems raise and their corresponding hypotheses.

Frequency and percentage were used to describe the level of occurrence of the natural calamities, level of damage of the area, and level losses in production and amount of income in the Eastern Visayas, Philippines.

The description was determined using the following procedure. The lowest score of 1, was deducted from the highest rate of 5. As adapted from Likert's rating the subtrahend was divide by 5. The addition of quotient started from the lowest rate and ended at the highest rate. The numeral ranges and corresponding verbal description, 5.00 being the highest interpreted as "Very High" and 1.00 being the lowest interpreted as "Very Low".

3. RESULTS AND DISCUSSION

Level of occurrence of natural destruction

Table 2 shows the level of occurrence of natural destruction in Eastern Visayas for the years 2017 to 2021. The table indicates that 14 calamities had occurred in the area. The level of occurrence of natural destruction was "sometimes" for the years 2017 (f=3), 2018 (f=2), and 2019 (f3). For 2020 the level is described as "often" (f=5) and for 2021 it is "seldom" (f=1).

Table 2. The Level of Occurrence of Natural Destruction in Eastern Visayas, the Philippines for the Year 2017 to 2021.

Year	Frequency	Description
2017	3	Sometimes
2018	2	Sometimes
2019	3	Sometimes
2020	5	Often
2021	1	Seldom
Total	**14**	

Level of damage of the area affected by natural calamities

Table 3 indicates the level of damage of the area (in hectares) affected by natural calamities in Eastern Visayas, Philippines for the years 2017 to 2021. In the recent year, 2021 the level of damage of the area is "very highly damaged" (f=26.71) as well as for the year 2017 (f=30.45). In the year 2019 the level was described as "highly damaged (f=24.04). The year 2020 the level was described as "moderately damaged" (f=18.24) while the year 2018 was described as "very less damaged" (f=0.56), respectively.

In connection with this finding, Zhao and Li (2015) observed that sugarcane production may have affected negatively and will be continue affected considerably by the increase in the frequency and intensity of extreme environmental conditions due to climate change including typhoons [5].

Table 3. The Level of Damage of the Area Affected by Natural Calamities in Eastern Visayas, the Philippines for the Year 2017 to 2021.

Year	Area Affected (hectares)	Percentage	Description
2017	1,227.80	30.45	Very Highly Damaged
2018	22.44	0.56	Very Less Damaged
2019	969.40	24.04	Highly Damaged
2020	735.67	18.24	Moderately Damaged
2021	1,077.48	26.71	Very Highly Damaged
Total	**4,032.79**	**100.00**	

Level of losses in sugar production and amount as caused by natural calamities

Table 4 shows the level of losses in production in LKG (1 LKG=50 kilo bag of sugar) and the amount caused by natural calamities that occurred in Eastern Visayas, the Philippines for the year 2017-2021. The year 2017 had described with "very high" losses (f=39.39). For 2019 it has a "high losses" (f=31.13) while 2020 had "moderate losses) (f=23.62). The years 2018 (f=0.72) and 2021 (f=5.14) had "very low losses".

More or less the same trend indicates in terms of the level of losses in the amount. In the year 2017, the level of losses in terms of the amount was described as "very high losses" (f=38.11). In the year 2019, the level of losses in the amount was described as "high losses" (f=30.07) while in the year 2020 the level of losses was described as "moderate losses" (f=22.85). The "very low losses" (f=8.28) level was shown in the years 2018 (f=0.69) and 2021 (f=8.28), respectively.

In relation to the production, the Philippine domestic production of raw sugar for Crop Year 2016-17 had failed to 2.27 million metric tons as compared to the previous Crop Year 2015-16 with a total production of 2.50 million metric tons (the highest after 34 years). The decrease in production was due mainly to "La Niña" (heavy rainfall) and the erratic weather condition [3].

Relatively, the group of Hattori, et. al. (2020) found out in their study that temperature and precipitation or rainfall from November and December had a significant effect on sucrose accumulation [1]. Strong typhoons usually occur in the months mentioned above.

Furthermore, temperatures and rainfall extreme that could happen during the occurrence of the typhoon had a high possibility of affecting sugarcane yields. Relatively, there were also quite a number of instances wherein extremes could not be the reasoned directly for yield fluctuations [2].

Table 3. The Level of Losses in Sugar Production (LKG) and Amount (in USD) as Caused by Natural Calamities that Occurred in Eastern Visayas, the Philippines for the Year 2017 to 2021.

Year	Losses	Percentage	Description
Production loss (LKG)			
2017	92,005	39.39	Very High Losses
2018	1,683	0.72	Very Low Losses
2019	72,707	31.13	High Losses
2020	55,176	23.62	Moderate Losses
2021	11,987	5.14	Very Low Losses
Total	233,558	100.00	
Amount loss (USD in millions)			
2017	2.760	38.11	Very High Losses
2018	0.050	0.69	Very Low Losses
2019	2.178	30.07	High Losses
2020	1.655	22.85	Moderate Losses
2021	0.599	8.28	Very Low Losses
Total	**7.242**	**100.00**	

Average Sugar Price: 30 USD/LKg (Conversion: Php 50.00 per 1 USD)

Formula: *(Source: Authors' design)*

$$P_l = \Sigma: b_s + l_s + s_a + s_{is} + u_s \qquad (1)$$

P_l - production loss
b_s - broken stalk
l_s - lodged stalk
s_a - shredded leaves
s_{is} - silted stalk
u_s - uprooted stalk

$$A_l = P_l \times s_p \qquad (2)$$

A_l - amount loss
P_l - production loss
s_p - sugar price

CONCLUSIONS

1. The most number of natural calamities that occurred for the year 2017 to 2021 was in 2020 with five calamites.
2. Very high damage in terms of area affected was experienced for the years 2017 and 2021
3. On the losses in terms of sugar production and income, it was experienced by the farmers last 2017

RECOMMENDATIONS

1. The government shall encourage the farmers to coordinate with Department of Agriculture so that their crop, including themselves, shall be cover with a crop insurance.
2. The Risk Reduction Management Team of the local or national government should assist the farmers before, during and after the occurrence of natural calamities
3. Provisions of free planting materials and fertilizers shall be available immediately after the occurrence of the natural for the farmers to start their recovery of the damaged area and crops.

ACKNOWLEDGEMENT

Our deepest gratitude to the sugarcane farmers and technical personnel who were involved during the data gathering.

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