

Impacts of a 'Double Disaster' on Small-Scale Grouper Farmers in the Bicol Region, Philippines

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ABSTRACT. The series of devastating typhoons during the COVID-19 pandemic was a remarkable event in the Philippines' history of natural disasters. This case study documented the impacts of the two overlapping shock events on the livelihood of small-scale grouper farmers in the towns of Ragay and Del Gallego, Camarines Sur, Philippines, while reflecting on their coping strategies and social support. The findings revealed that the typhoons induced additional pressure on the well-being of the farmers while they were still dealing with the negative impacts of the pandemic. The contributing aspects to their livelihood vulnerability were attributed to their limited adaptive capacity to withstand various shocks and the susceptibility of their farm sites to repeated natural hazards. The study also identified different coping strategies the farmers undertook, including the roles of social support, in dealing with the impacts of these shocks. Establishing anticipatory action protocols is necessary to manage the long-term impact of repeated shocks to strengthen their livelihood and household resilience.

1.0. Introduction

The COVID-19 pandemic has resulted in various economic, health, and social impacts worldwide (Abrams & Szeffler, 2020). For instance, in 2020, millions of full-time jobs were lost globally, putting more people in extreme poverty (International Labour Organization [ILO], 2021). In the Philippines, the annual unemployment rate reached a record high of 10.3 percent at the end of 2020 (Philippine Statistics Authority [PSA], 2021). These were the immediate impact of quarantine restrictions for most countries, which were put in place to slow the spread of the virus.

The strict containment measures impede job creation as an indicator of economic revitalization. According to De Vera and Aning (2021), citing the National Economic and Development Authority (NEDA), job creation depends on the degree of restrictiveness of community quarantines. The poorest and disaster-prone communities in the Philippines were the most affected by these community restrictions (Fallesen, 2021). Thus, they were at risk of experiencing substantial economic hardships.

In addition, extreme weather events threaten

people's livelihoods, especially in coastal communities (Almutairi *et al.*, 2020). For instance, Typhoon Yolanda, among the most powerful and destructive storms recorded in history, severely affected the coastal communities in the worst-hit provinces in the country. Anticamara and Go (2015) claimed that the destruction of fishery resources after Yolanda contributed to high poverty levels for fishers in affected areas. Hence, the impact of typhoons can significantly affect local economic activities (Strobl, 2019).

At the height of the pandemic, 22 tropical cyclones entered the Philippine Area of Responsibility (PAR) in 2020 (Philippine Atmospheric, Geophysical and Astronomical Services Administration [PAGASA], 2020). Nine tropical cyclones made landfall, with six hitting the Bicol Region directly. Among these six tropical cyclones, there was one tropical depression (Ofel), one tropical storm (Tonyo), three typhoons (Ambo, Quinta, and Ulysses), and one super typhoon (Rolly). Among these six tropical cyclones, Quinta, Rolly, and Ulysses were the most notable for Bicolanos because they were destructive and struck quickly from October to November 2020 (Figure 1).

The confluence of these extreme weather events and COVID-19 can be considered remarkable events in the history of natural

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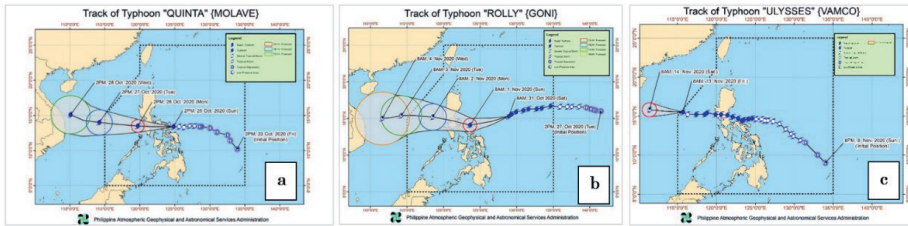


Figure 1. Tropical cyclone tracts of (a) Quinta, (b) Rolly, and (c) Ulysses between October to November 2020. Source: PAGASA

disasters in the Philippines. Also, the impacts of these events, especially in already vulnerable rural communities, may have even more devastating impacts on their socioeconomic well-being. Thus, rural livelihoods are at risk of these compounding risks of COVID-19 and recurrent typhoons that could deprive households of productive assets and access to markets. Hence, this study aimed to assess the impacts of a 'double disaster' on rural livelihoods in coastal communities in the case of small-scale grouper farmers in the Bicol Region, Philippines. This study sought to document the shocks and their impacts experienced and observed by the farmers from October 2020 to April 2021. The assessment utilized the three dimensions of disaster and coping processes following Eriksson and colleagues (2017). These include (1) shocks and their impacts, (2) assessment of impacts on livelihood capital assets, and (3) strategies to cope with impacts. Policy implications were derived to inform effective measures for the adaptive capacity development of grouper farmers.

2.0. Framework of the Study

One way to better understand the livelihoods of rural households, especially the poor, is by applying the sustainable livelihoods framework (SLF) as a tool (Figure 2). This approach was developed by the Department for International Development [DFID] (1999) to assess the effectiveness of existing efforts to reduce poverty. It is also useful in identifying the factors that constrain or enhance livelihood opportunities and shows how they relate (Serrat, 2017). It can provide implications in formulating the design and implementation of development projects in sustaining livelihoods.

While the analysis could begin in any of the SLF components, the study considered vulnerability context as the initial starting point, as DFID (1999) suggested. In this case, the impacts of the 'double disaster', that is, the confluence of extreme weather events during the height of the pandemic experienced by the grouper farmers, were analyzed to understand its implications for the livelihood capital assets of each household. This also includes the transforming structures

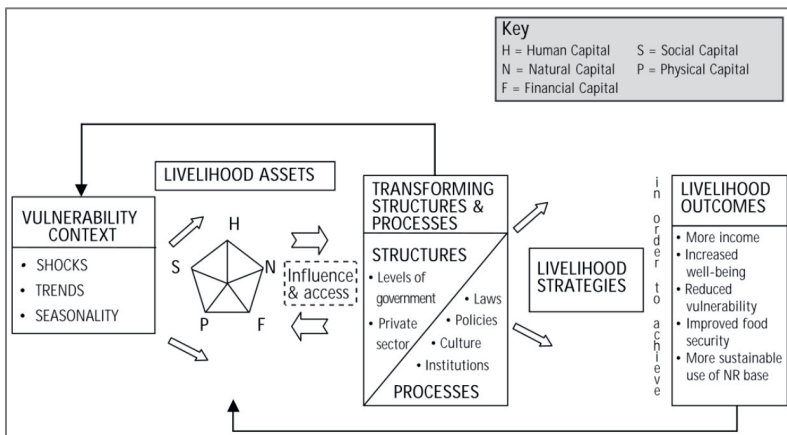


Figure 2. The sustainable livelihoods framework. See DFID (1999) for more detailed descriptions of sustainable livelihoods. Graph from DFID (1999).

and processes and their livelihood strategies and outcomes.

The livelihood assets (or capital) component is considered the core element of the framework that considers the different kinds of assets and resources that are likely to play a role in household livelihoods. These assets are interlinked and consist of the following: human (H), natural (N), financial (F), physical (P), and social (S). These are commonly illustrated as a pentagon to facilitate the visual presentation of information on a household's livelihood assets (Figure 2).

The SLF is widely known to better understand the livelihoods of the poor, where livelihood largely depends on the output from traditional agriculture (Sati & Vangchhia, 2017). It deals with various interrelated factors that limit or enhance livelihood opportunities. It offers opportunities to look at contexts and relationships to make development activities more process-oriented. This study used this approach to organize the assessment of grouper farming households' existing assets and how shocks impacted these assets at the time of the assessment.

3.0. Methodology

Study sites. The study focused on five grouper (locally known as "*lapu-lapu*") culture farm sites within the municipal waters of Del Gallego and Ragay, Camarines Sur, in the Bicol Region, Philippines. Two farm sites were in Del Gallego, specifically in the *barangays* of Magais I and Sabang (Figure 3). The other three sites covered were in Ragay, in the *barangays* of Catabangan, Lower Omon, and Buenasuerte (Figure 3).

These farm sites were owned by the registered fisherfolk organizations (FOs), which later became recipients of the Fisheries, Coastal Resources, and Livelihood Project (FishCORAL),

a poverty alleviation initiative of the Philippine government and the International Fund for Agricultural Development (IFAD). The project, which ran from 2016 to 2020, aimed to reduce poverty in economically challenged coastal communities in the Philippines (IFAD, 2015).

Data Collection. This study employed empirical-analytical scientific inquiry to generate an in-depth and multi-faceted understanding of the impacts of a 'double disaster' on the livelihoods of grouper farmers. Specifically, qualitative and quantitative data were collected using semi-structured in-depth interviews, focus group discussions (FGDs), and observations of the grouper farmers. Key informant interviews with focal persons from the municipal agriculture offices (MAOs) of the two towns and the community facilitators from the Bureau of Fisheries and Aquatic Resources Regional Office V (BFAR V) were also conducted as a form of triangulation.

Preliminary activities were carried out before the actual interviews. These included developing the semi-structured questionnaire, training the research team members, coordinating with the concerned local government units and the offices of the *barangay* captain for each *barangay*, and pretesting. In addition, to establish the reliability and validity of the research instrument, expert opinion and approval from the university were sought prior to its implementation. The data collection occurred in the identified grouper farm sites in Del Gallego and Ragay, Camarines Sur, in April 2021 while observing the mandatory COVID-19 health protocols.

The questionnaire was divided into three parts. The first two sections of the questionnaire, composed of the household profile and livelihood asset ownership, were adopted from

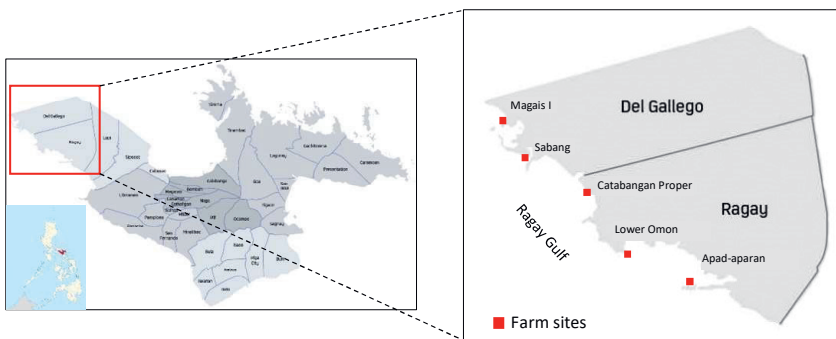


Figure 3. Study sites in Del Gallego and Ragay, Camarines Sur, Bicol Region, Philippines. Source: Provincial Government of Camarines Sur

the standard surveys of the PSA, which are the Family Income and Expenditure Survey (FIES) and the Annual Poverty Indicators Survey (APIS). On the other hand, the last part of the questionnaire was designed to collect qualitative data to support the quantitative results.

The grouper farmers as the study participants were purposefully selected because they were directly involved in the operations of their grouper fish cages. They can also best inform the research questions and provide a deeper contextual understanding of the phenomenon under study (Creswell & Creswell, 2018). A total of 43 grouper farmers were interviewed using the questionnaire. Twenty-one farmers were interviewed across the two FOs in Del Gallego. Fifteen of them were from the *Barangay* Sabang Fisherfolk Association (BSBA), and the other six were from the Magais Rail Fisherfolk Association (MRFA). Meanwhile, 22 farmers were interviewed across the three FOs in Ragay. Nine of them were from the Apad-apan Fisherfolk Association (AFA), three from the Malayang Samahan sa Ikakaunlad ng Catabangan Proper (MSICP), and ten from the Samahan ng Mangingisda ng Lower Omon (SMLO).

Immediately after the one-on-one interviews for each farm site, the farmers were also convened for the FGD to evaluate the impacts of the simultaneous existence of COVID-19 and typhoons on their grouper farming livelihood. The FGD also tackled their coping strategies and social support based on their experiences and descriptions. To cross-validate the accounts of the study participants, a separate schedule was established for conducting interviews with community facilitators of BFAR V assigned to each town and the focal persons from the respective MAOs.

Sensitivity and courtesy were observed during the whole process of the interviews. Study participants were given informed consent, emphasizing the anonymity and confidentiality of their responses. It was made clear that their participation was entirely voluntary and that their information would be kept confidential and anonymous.

Further, the data collected on household socioeconomic characteristics were treated and analyzed using descriptive statistics. These were presented using tabular presentations. The qualitative data, on the other hand, were examined and organized based on the study participants' narratives.

4.0. Results and Discussion

Socio-demographic and economic characteristics of the grouper farming households

The household socioeconomic profile of the grouper farmers (Table 1) revealed that more than half of their total household members (62%) were in their "economically productive" ages (15 to 64 years). The study identified that more than half (61%) of the household members were considered "dependent," and over 50 percent of the dependents were children. This figure was relatively higher than the national age dependency ratio of 55.2 percent in 2020 (World Bank, 2020).

Male-headed households account for 84 percent of all households in charge of making decisions and earning money. Most household heads had only completed elementary school, with only a few having completed high school or college (Table 1). The grouper farming households consist of an average of five persons, which was relatively higher than the national average of four family members (PSA & ICF, 2018). Most had one to five persons in the family (63%).

The average monthly income of the grouper farming households was Php 8,908 (\$185.27)–Table 1. This was relatively lower than the national average of Php 26,083 (\$542.49) and the regional average of Php 19,583 (\$407.30) (PSA, 2020). Most of the income of the households was derived from fishing. Their monthly income ranged from Php 1,500 to Php 31,150 (\$31.19–\$647.87).

Shocks and their impacts

In 2020, the grouper farmers experienced two shocks (natural and health shocks). The natural shock was the three consecutive powerful typhoons that impacted the grouper farm sites in the fourth quarter of 2020. These typhoons, which occurred in the middle of the COVID-19 pandemic (health shock), severely devastated the already afflicted fishing communities of farmers due to the latter. Before the typhoons, the farmers were already struggling because of the public health responses to the COVID-19 pandemic and related measures, from social distancing to enhanced community quarantines (ECQs) and border controls. The ECQ is the strictest version of the COVID-related lockdown being enforced by the government.

Table 1. Socio-demographic and economic characteristics of the grouper farming households

| Indicators | f | % |
|---------------------------------------|---------------|----|
| Total population by age dependency | | |
| Child (below 14) | 73 | 33 |
| Working age (15–64) | 137 | 62 |
| Senior (65 and above) | 10 | 5 |
| Child dependency ratio | | 53 |
| Old-age dependency ratio | | 7 |
| Age dependency ratio | | 61 |
| Gender of HH Head | | |
| Male | 36 | 84 |
| Female | 7 | 16 |
| Educational Attainment of HH head | | |
| Elementary level | 7 | 16 |
| Elementary graduate | 15 | 35 |
| High school level | 6 | 14 |
| High school graduate | 6 | 14 |
| College level | 7 | 16 |
| Vocational | 2 | 5 |
| Average HH size (SD) | 5(2) | |
| Average HH monthly income in Php (SD) | 8,908 (5,431) | |

Notes: HH means household; SD means standard deviation; Php means Philippine Peso; US\$1 = PhP48.08 in April 2021, when data were collected. Source: Author’s calculations

During the pre-pandemic period, the grouper farmers already experienced several fish cage management difficulties. For example, all farm sites had a high mortality rate of grouper fry (or fingerlings) days after stocking in every fish cage. Each floating net cage can accommodate 1,200 pieces of grouper fry. Farmers blamed the problem on improper handling procedures to transport grouper fry from the hatchery in Mercedes, Camarines Norte, a 100-kilometer drive that takes at least two hours. Another case was encountered by some FOs in which their net cage had been ripped off, causing the stocked groupers to escape.

“Out of 590 pieces of groupers, only 170 pieces were left after our net cage was ripped off. We also tried to recover the groupers, but we only got 60 pieces.” (Farmer, Lower Omon, personal communication, April 10, 2021).

This was followed by a series of fish kills due to high temperatures and disease outbreaks (e.g., Harikrishnan *et al.*, 2011). Moreover, most farmers admitted to having limited knowledge and skills in the health management and production strategy of grouper culture. Even the cause of the fish kills was unknown to them at the time. The FOs heavily relied on members with

prior experience in grouper culture to manage the cages.

“The groupers had white spots, but we did not know what it was.” (Farmer, Catabangan, personal communication, April 10, 2021).

“If we do not have members who know how to take care of the grouper, maybe something worse could happen.” (Farmer, Lower Omon, personal communication, April 10, 2021).

These pre-pandemic experiences have already compromised their livelihood, reduced incomes, increased vulnerability, and affected their ability to access food. The ‘double disaster’ event exacerbated the effect of the existing stressors by triggering a cascade of impacts that collectively made it challenging for farmers to cope. The community restrictions significantly impacted the demand and prices for fish products such as the live groupers, resulting in income reduction for the farmers. For instance, one farmer from MRFA stated that the farm gate price of live grouper was reduced by as much as 50 percent due to lockdowns.

“The pre-pandemic price of live groupers per kilo was Php 680

(\$13.04), but it dropped to Php 380 (\$7.29) after the community quarantines were implemented". (Farmer, Magais, personal communication, April 12, 2021).

This also confirms the findings of Manlosa and colleagues (2021). Grouper farmers attributed this price decline to the confinement measures by the Philippine government that led to the temporary closure of fish markets, restaurants, and other supply chain channels. The mobility restrictions have resulted in a collapse in demand for locally-sourced fish, particularly high-value seafood, and a reduction in fishing activity (Ferrer *et al.*, 2021). Due to border control checkpoints, most farmers reported that mobility restrictions impede access to input materials such as formulated feeds and fingerlings.

"We were not allowed to go outside our homes to check our cages or engage in other fishing activities because most of us in our associations are senior citizens with comorbidities." (Farmer, Sabang, personal communication, April 12, 2021).

"The feeds are being provided for free as part of the project, but they have yet to be delivered to us due to border control checkpoints" (Farmer, Magais, personal communication, April 12, 2021).

The pandemic affected the distribution channels of live groupers and other commercial fishes, access to production inputs, and the local labor market in the small-scale fisheries value chain, leading to job loss and income reduction. Davila and colleagues (2021) argued that loss of employment and economic contraction caused by the pandemic have ramifications for food value chains and smallholder livelihoods. However, when community quarantine restrictions were gradually eased during the first quarter of 2021, the farm gate price of live groupers was increased to Php 490 (\$9.40) per kilo. This indicates that the price increase of live groupers is accompanied by the easing of community quarantine restrictions which allows greater economic activities. According to NEDA (2022), the Philippines' socioeconomic planning body, easing lockdown measures can boost the economy and contribute to employment generation. However, alongside this economic recovery strategy, the challenge of not overwhelming the health system arise.

The series of three strong typhoons have further compounded this impact amid the pandemic. The floating fish cages across all farm sites were severely destroyed, resulting in fish kills (see Figure 4) and the escape of some groupers in the wild. A farmer from the AFA shared that the fish kill cost them Php 190,000.00 (\$3,951.74).

"Experiencing this loss after sacrificing your time and effort for nothing was truly devastating." (Farmer, Apad-aparan, personal communication, April 9, 2021).

Some floating fish cages were destroyed entirely, such as in the case of SMLO and the BSBA. Later, these two FOs stopped their fish cage operations because some fish cage structures, including their stocked fish feeds, were completely destroyed. In addition, their dwellings, drinking water sources, and crops were also devastated by the typhoons, making them more at risk of poverty.

"We have given up hope of continuing the cage operations because of the severe damage brought especially by Typhon Rolly." (Farmer, Lower Omon, personal communication, April 10, 2021).

"We have to pay for a banca just to get drinking water on the mainland. This is an additional expense for my family." (Farmer, Apad-aparan, personal communication, April 9, 2021).

Weather disturbances greatly contribute to transient or short-term poverty, which can seriously affect household income and consumption (Dacuycuy & Baje, 2017). These experiences and observations of the farmers indicate a low adaptive capacity to withstand shocks like extreme climatic events (e.g., Amevenku *et al.*, 2019).

The effects of this 'double disaster' were further analysed by looking at their poverty status at the time of assessment. It was revealed that the farmers contained higher proportions of poor households than the national, regional, and provincial averages. Roughly 62.8 percent were below the provincial poverty threshold (Table 2). This figure was relatively higher than the national average of 12.1 percent, the regional average of 19.9 percent, and the provincial average of 20.6 percent (PSA, 2020). Further, the current poverty



Figure 4. (a) Dead marketable-sized groupers after Typhoon Ulysses at Sitio Apad-apan, Buenasuerte, Ragay, Camarines Sur on November 10, 2020. (b) Some wasted groupers were distributed to the neighborhoods for free, while others were dried for fish processing. (Source: Apad-apan Fisherfolk Association)

incidence of grouper farmers was even higher than the 42% baseline of the FishCORAL (IFAD, 2015).

The current poverty incidence indicates that their incomes were insufficient to purchase their families' minimum basic food and non-food needs. However, there is more concern with those households that cannot even buy the minimum basic food needs alone (subsistence incidence), which accounted for 62.8 percent (Table 2). Despite the difficult economic conditions, most farmers remained optimistic that their income would increase once things returned to normal.

"The pandemic and its subsequent lockdown measures plus the recurrent typhoons made us now rely heavily on 4Ps (the government's social protection policy) and small loans to get by on a daily basis." (Farmer, Catabangan Proper, personal communication, April 10, 2021).

"I am still hoping that once the pandemic has passed and we have recovered from the effects of the natural disasters, we will be able to

return to cage operations and seek other sources of income." (Farmer, Sabang, personal communication, April 12, 2021).

The assessment also explored household consumption expenditure as an indicator of poverty measurement. The income-based poverty indicator might be inaccurate because of a high chance of under or overreporting income disclosure from different sources. This makes the consumption expenditure on goods and services a better proxy for material living standards, especially for low-income households (United Nations Economic Commission for Europe [UNECE], 2017).

A few months after the last typhoon, the households experienced a decline in consumption expenditures, particularly for food, because of the temporary increase in food prices caused by supply disruptions. This confirms the findings of a similar study (Skoufias *et al.*, 2019). Consequently, some farmers relied on relief goods and garden crops for a few weeks. However, two months after the last typhoon, grouper farmers have been better able to access food from the local markets.

Table 2. Poverty and subsistence incidence of household beneficiaries

| Income Cluster ^{a/} | Definition | Food Threshold ^{b/} | | Poverty Threshold ^{c/} | |
|---------------------------------|---|------------------------------|------|---------------------------------|------|
| | | Frequency | % | Frequency | % |
| Poor | Below the official food/poverty threshold | 27 | 62.8 | 20 | 46.5 |
| Low-income class (but not poor) | Between the poverty line and twice the poverty line | 12 | 27.9 | 16 | 37.2 |
| Lower middle-income class | Between 2 and 4 times the poverty line | 4 | 9.3 | 6 | 14 |
| Middle middle-income class | Between 4 and 7 times the poverty line | | | 1 | 2.3 |

Author's calculations based on the provincial per capita poverty threshold for food and income poverty in 2018 in Camarines Sur.

^{a/}Source: Albert, Santos, & Vizmanos (2018)

^{b/}Provincial annual food threshold at Php 16,902.00 (\$351.54)

^{c/}Provincial annual poverty threshold at Php 24,209.00 (\$503.51)

The average monthly consumption expenditure of households during the assessment was estimated at Php 11,384 (\$218.18). This is relatively lower than national estimates at Php 19,887 (\$381.15) and regional estimates at Php 16,118 (\$308.92). Also, this level of consumption expenditure was greater than the monthly household income of the farmers. Accordingly, this level of consumption expenditure may mean that, on average, households cannot meet their material wants and needs for food, shelter, social activity, and other items. Food and non-alcoholic beverages (48.31 percent) accounted for the highest proportion of consumption expenditure (Table 3). This figure was not surprising that the households' priority was food rather than other consumption expenditure items. More than half (63%) of grouper farming households perceived that they did not see any changes in the level and quality of their consumption in terms of goods and services purchased even after the inception of the livelihood intervention. Moreover, many (49%) were already satisfied with their current consumption level.

"If we can eat at least three times a day, that is already enough for my family." (Farmer, Lower Omon, personal communication, April 10, 2021).

Assessment of impacts on livelihood capital assets

The combined effects of the pandemic and recurrent typhoons resulted in market disruptions, limited grouper production, and households' inaccessibility to livelihood assets. Among the capital assets severely impacted the most by this 'double disaster' was the natural capital. The pandemic caused the disruptive availability of production inputs which coincided with reduced demand and collapsed market

prices resulting in lower grouper production. Furthermore, even during the lockdowns, a high mortality rate of groupers persisted. These existing stressors were exacerbated by the three consecutive powerful typhoons, making it more difficult for grouper farmers to cope and pursue their livelihoods.

The impacts on natural capital had a direct causal sequence on their financial capital because their sources of income, primarily from fishing and crop farming, were lost. This was felt among the members of FOs across farm sites. The decrease in their income also affected their expenditures to meet the daily needs of their family members. At the onset of ECQ, fishing was also prohibited in compliance with quarantine protocols, affecting the volume of their catch and eventually their incomes (e.g., Macusi et al., 2022). Most farmers explained that they were allowed to go fishing when the restriction was eased to modified general community quarantine. However, the problem was that they could not sell their catch because there were no buyers other than locals who could not afford high-grade fish like groupers. Another problem they encountered was the ice availability which exacerbated their ability to preserve the fresh sea harvest.

"During GCQ, we are permitted to go fishing and visit our fish cages. We took advantage of the chance to harvest our groupers, but we had difficulty selling them because the assemblers had mobility issues." (Farmer, Magais, personal communication, April 12, 2021).

"We had a problem finding ice for preserving groupers after the harvest. The ice would have helped while we waited for buyers." (Farmer, Catabangan, personal communication, April 10, 2022).

Table 3. Household expenditures and other disbursements

| Expenditure Items | Average Monthly Expenditure (inPhilippine Pesos) | % |
|---|--|-------|
| Food and Non-alcoholic beverages | 5,546.77 | 48.31 |
| Transportation | 1,634.40 | 14.23 |
| Housing, water, electricity, gas, and other fuels | 997.91 | 8.69 |
| Payments of loans and other disbursements | 975.02 | 8.49 |
| Health | 530.65 | 4.62 |
| Furnishings and routine household maintenance | 506.81 | 4.41 |
| Alcoholic beverages and tobacco | 409.58 | 3.57 |
| Communication | 305.29 | 2.66 |
| Education | 300.26 | 2.61 |
| Clothing and footwear | 200.21 | 1.74 |
| Miscellaneous goods and services | 75.88 | 0.66 |

Note: US\$1 = Php 48.08 in April 2021, when data were collected.

During the lockdown, social capital was compromised since social gatherings were also restricted, including the regular meetings of the FOs, which deprived the farmers of opportunities to socialize with other members. Even going outside their homes was prohibited due to the added fear of virus transmission. Thus, the pandemic, like other common disasters in the Philippines, has contributed to psycho-social stress in some people (Lamberte et al., 2021).

“At the height of the pandemic, you thought the virus was right outside, so you were afraid to leave your house.” (Farmer, Sabang, personal communication, April 12, 2021).

During group discussions, no one mentioned that they or any members of their families or neighbors were infected with COVID-19. When people in the *barangay* were gradually allowed to leave their houses, they started socializing while observing health protocols. For instance, most of them mentioned that they became accustomed to wearing face masks and observing social distancing when attending a meeting or social gathering. This at least reduced their social anxiety and mental stress. As observed by the grouper farmers, social capital was perceived to be less impacted even during typhoons.

“I am occasionally invited to special events in our area, such as baptisms or birthday parties, while still wearing a mask and observing physical distancing. These occasions somehow aid in easing my mental stress.” (Farmer, Lower Omon, personal communication, April 10, 2021).

During the assessment period, five months after the last typhoon, the physical assets were restored to pre-shock condition. For example, their homes were rebuilt, the water supply, communication, and power were restored, and transportation routes were re-established. However, some people continued drinking water from water refilling stations.

Human capital was also deemed compromised at some farm sites because community quarantines prevented them from exchanging knowledge and skills on grouper farming. As a result, some farmers with little experience in grouper farming found it more challenging to maintain their cages. In addition, the well-being of older farmers and those with comorbidities and other health risks were

also affected after they were ordered to stay at home during the quarantine period. This finding confirms the study of Buenaventura and colleagues (2020).

Strategies to cope with impacts

The COVID-19 pandemic is an example of an extreme and rare event that has made the lives of people worldwide more challenging. This situation, coupled with natural hazards, induced additional pressure on the well-being of people, as in the case of this study. These two overlapping shock events (compound risk) led to various coping strategies in the study areas.

When border restrictions were implemented in areas placed under ECQ, such as Camarines Sur, the distribution channels of formulated feeds and other input materials were interrupted. Consequently, farmers relied heavily on low-value marine ‘trash fish’ (Figure 5) as an alternative aquaculture feed for groupers like *sapsap* (slipmouth fish), tilapia, *guno* (silverside fish), and *balaw* (small prawns).

“The delivery of feeds was delayed when there was an unexpected lockdown. So, we had to rely on trash fish while we waited for the feeds to be delivered.” (Farmer, Catabangan, personal communication, April 10, 2021).

However, farmers’ reliance on trash fish raises costs because they must still buy it from other fishers. When the feeds were delivered, they eventually mixed them with trash fish. Group discussions revealed that groupers preferred trash fish over commercial feeds, indicating that they are not accustomed to eating the latter. Hence, they keep on buying trash fish.

“We noticed that the grouper was not eating the feeds, so we sold some sacks of feeds and bought trash fish instead.” (Farmer, Lower Omon, personal communication, April 10, 2021).

Meanwhile, to cope with market disruptions, most farmers were forced to sell their harvested groupers to wholesale assemblers despite lower farm gate prices. Typically, wholesale assemblers are the ones who dictate the farm gate price. Some farmers tried to peddle their harvested groupers within their communities. However, the price was not that high compared to fish markets.



Figure 5. Some female grouper farmers preparing 'trash fish' for feeding. (Source: Magais Rail Fisherfolk Association)

"We are forced to sell our harvested groupers to assemblers, even if the price is low so that these do not go to waste. Then the rest is sold in the *barangay*." (Farmer, Magais, personal communication, April 12, 2021).

Some farmers started growing vegetables in their backyards to supplement their income and as a food source. In a way, backyard gardening prevented them from frequently visiting the market and contracting the virus outside their homes.

The FOs still received technical assistance from MAO and BFAR as part of their monitoring interventions, even during quarantine, such as connecting them to new markets. Farmers communicated their concerns to the staff of these offices in the hopes of prompt action, typically via cell phone. In most cases, some members with prior knowledge of grouper culture shared their knowledge of proper feeding and other management practices with their co-members. This knowledge-sharing activity was usually done when restrictions were relaxed.

"Fortunately, some of our members are knowledgeable about grouper culture, so they can impart their knowledge to less experienced members like me." (Farmer, Lower Omon, personal communication, April 10, 2021).

Some farmers also qualified for financial assistance through the government's Social Amelioration Program—a cash subsidy program for low-income households affected by the pandemic. Some had access to credit from microfinance institutions and received cash assistance from family members and relatives. In addition, the affiliation of farmers with their

respective FOs provided them with informal safety nets for dealing with shocks, mainly through low-interest credit assistance.

"We allocated our grouper sales to the association to fund our credit assistance program so that when members need credit, we can help." (Farmer, Sabang, personal communication, April 12, 2021).

When the series of typhoons strike, things get worse for them. They felt hopeless because their floating net cages were severely destroyed, and most groupers were lost. Nonetheless, three out of five FOs decided to continue their cage operations by repairing the retrieved fish cage materials as much as possible. For instance, the two fish cages managed by AFA and MSICP had only one functional cage left after Typhoon Ulysses (the last typhoon that visited the region in 2020). The MAO and BFAR assisted in recovering their livelihoods in the form of technical assistance and lobbying.

"We were given two cages, but after Typhoon Rolly, there was just one left. The LGU and the BFAR assisted us in regaining our livelihood." (Farmer, Apad-apan, personal communication, April 9, 2021).

During group discussions, farmers from BSBA and the SMLO were still hoping that the government would again provide them with free materials and structures needed to reconstruct cages so that they could resume their operations.

Food aid in the form of relief goods was provided to the farmers after each typhoon to address their immediate food needs. The distribution of relief goods was spearheaded by the LGU and the Department of Social Welfare and Development (DSWD) in coordination with

the *barangay* captains. Furthermore, following Typhoon Quinta, some farmers stated that they had borrowed money from relatives and neighbors to repair their damaged homes. When another typhoon (STY Ulysses) damaged their homes, they borrowed again for the same purpose.

“Because the pandemic and typhoons have had such a devastating impact on us, I am grateful to have relatives who are still supporting us.” (Farmer, Sabang, personal communication, April 12, 2021).

These experiences of the grouper farmers indicate greater reliance on the government and community members to deal with the impacts of disasters. Similar studies also confirm these experiences (Macusi *et al.*, 2022; Manlosa *et al.*, 2021). This demonstrates that FOs were not yet organizationally matured enough to handle various shocks. Further, literature shows that households with better access to livelihood assets tend to recover faster from climatic disturbances (Brown *et al.*, 2019). Thus, their livelihood resilience must be improved by giving them appropriate interventions that promote sustainability (Amadu *et al.*, 2021). Building on people’s adaptive capacity, which forms part of a well-planned disaster risk reduction program, is also strategic to minimizing the impacts of climate-induced disasters (Cinner *et al.*, 2018; Lopez Jr. *et al.*, 2022).

5.0. Conclusion

Using the sustainable livelihood assets framework, the impacts of the compounding risks of the COVID-19 pandemic and strong typhoons were documented in the case of grouper farmers in the Bicol Region, Philippines. The study provided the observations and actual experiences encountered by the grouper farmers during the series of typhoons amidst the pandemic while reflecting on their coping strategies and social support. This study also contributed to the emerging literature on the impacts of the pandemic on local aquatic food systems.

Based on the findings, the typhoons induced additional pressure on the well-being of the farmers while they were still struggling with the impacts of the pandemic and its subsequent quarantine measures. The susceptibility of their farm sites to repeated natural hazards and their limited adaptive capacity to withstand

various shocks contributed to the vulnerability of their livelihoods. Hence, there is an urgent need to improve their livelihood and household resilience by investing in their adaptive capacity, enabling them to take anticipatory action. For instance, the findings of this study can be used in formulating an updated disaster risk reduction and management plan for LGUs to strengthen their existing practices. Also, a business continuity plan for each FO can be made through the technical assistance of the academe and private organizations to give them a formal system of prevention and recovery from potential threats. Furthermore, future alternative livelihoods must be targeted based on the needs and abilities of the fishers and other underlying considerations. Fishers must scrutinize the resulting livelihood options before their acceptance to ensure long-term benefits.

This study has some limitations and constraints that must be recognized. The assessment was conducted after the series of typhoons. Thus, the baseline data which could have described the “before scenario” was not captured. The data on experiences and observations obtained through recall from the study participants only focused on events that transpired during and after the ‘double disaster’ under investigation. Nevertheless, the study participants themselves provided meaningful insights that contributed to the full understanding of the impacts of the extreme events they experienced.

For future research directions, a follow-up assessment can be made to identify the constraining and enabling factors affecting the livelihoods of grouper farmers after lifting the pandemic-related mobility restrictions. This follow-up study should also document the contributions made by local institutions as well as the livelihood strategies the farmers undertook and the outcomes they achieved, whether positive or negative.

6.0. Declaration of Conflicting Interest

The authors declare no potential conflict of interest that could have influenced the results of the study.

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