

RESEARCH PAPER**OPEN ACCESS****Adapting to shocks and stressors: Aqua-marine processors approach****Kathlyn A. Mata****Cagayan State University at Aparri, Maura, Aparri, Cagayan, Philippines***Key words:** Shocks, Stressors, Aqua-marine processors, ProcessorsDOI: <https://dx.doi.org/10.12692/jbes/27.4.57-64>**[Published: October 12, 2025]****ABSTRACT**

The purpose of this study was to determine the stressors and shocks that the aqua-marine resource processors encountered, as well as the coping strategies that were employed in response. Sixty-nine respondents were chosen from the study area using snowball and purposeful sampling procedures. A systematic questionnaire was used to gather primary data, which was then cross-checked with unstructured focus groups and critical information. The data was analyzed using descriptive statistics. According to the study's findings, women predominate in the processing of aqua-marine resources products; most of these women were middle-aged or older, and only a small percentage had earned a formal degree. In contrast to auxiliary taxes, unfavorable weather conditions, inadequate weather knowledge, poor decisions regarding the supply of fish caught, and the lack or non-availability of materials and equipment, the onset of the COVID-19 pandemic and the death of a loved one were significant shocks to the processors. The aqua-marine processors use a variety of coping strategies, including conducting business on a consignment basis, shipping the processed goods to Manila for storage, taking risks, and praying for divine intervention. The study highly recommends the following: setting up an organization for the processors, assisting them in applying to government agencies for equipment and livelihood support, and training them concerning business strategies and technologies, such as the use of alternative food processing methods.

***Corresponding Author:** Kathlyn A. Mata ✉ kathlynmata@csu.edu.ph*  <https://orcid.org/0000-0001-8325-5241>

INTRODUCTION

Aparri has a vast area of aquatic resources and this is the reason why aqua-marine resource processing is one of the life sources of those living near the coastal area. Their everyday life focus on aquatic-related activities. The males do the fishing while the women do the selling.

When it comes to processing both males and females participate in the activity. The processors whose processing strategy focused on drying and fermenting do the activities in a conventional manner. They rely solely on sun drying. Although they contribute to our food on the table, ironically, they can hardly sustain their own needs. In the poverty statistics of the National Statistics Authority in 2012, fishers are among the poorest sector in the country.

After almost a decade, in 2021 survey the fishers are still regarded as the poorest sectors in the country (Philippine Statistics Authority, 2023). It is known that their sector is the poorest yet the sector was only given 3.15 percent budget allocation in 2024 (House of Representative 19th Congress, 2024).

Under the 2030 Agenda on Sustainable Development Goals, the following will be addressed: SDG 1 – no poverty, particularly on target 1.1 on eradication of extreme poverty for all people everywhere ; SDG 2 – zero hunger, under target 2.1 on ending hunger and ensure access by all people, in particular the poor and people in vulnerable situations, SDG 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all – on target 8.3 addressing the promotion of development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services and; SDG 12 – Responsible consumption and production focusing on target 12.3 on the reduction of food losses along production and supply chains, including post-harvest losses (United Nations Department of Economic and Social Affairs Sustainable Development, 2024). The Cagayan State University, having its mandate to reach

to its stakeholders and the bigger community commit to help the deprived and needy.

The study determined the shocks, and stressors encountered by the aqua-marine resource processors (ARP) residing along the coastal barangays of Aparri, Cagayan. Specifically, it sought answers to the following questions: What are the shocks encountered by the aqua-marine resource processors? What are the stressors encountered by the aqua-marine resource processors? What are the coping mechanisms practiced by the aqua-marine resource processors? What is the proposed extension project for the aqua-marine resource processors?

Conceptual framework

The study made use of the theory of Eliyahu M. Goldratt's Theory of Constraints (TOC). His theory is based on the idea that every system has at least one constraint that limits its performance. There are five key steps of the theory: identify the constraint, exploit the constraint, subordinate everything else to the constraint, elevate the constraint; and avoid inertia, and repeat the process. The fourth speaks of the steps where major changes are considered to eliminate the constraint. This is done when the existing system or procedure is not effective (Esan, 2012).

Another theory that was used is the social support theory which is a psychological framework that explains how social relationships can improve a person's emotional state, especially during trying times. This theory suggests that when people have strong support groups, they cope better with stress in life (Wills, 1985)

MATERIALS AND METHODS

The exploratory-descriptive qualitative (EDQ) research design was employed in this study. The profile of the respondents were described and the shocks and stressors encountered by the respondents were described; and their coping mechanisms were investigated.

The study was conducted at Maura, Aparri, Cagayan. This barangay is located in the eastern coastal area of

Aparri, Cagayan where aqua-marine resource processors are not yet organized.

Residents of Maura, Aparri, Cagayan, whose main source of living is fish and crustacean (aqua-marine) processing were taken as respondents. Spider shrimp (*Nematopalaemon tenuipes*), small-head hairtail (*Lepturacanthus savala*), largehead hairtail (*Trichiurus lepturus*), bigeye scad were among the major kinds of fish that they process. They Purposive snowball technique was used as a means of determining the respondents. The Maura local government unit was a great help in locating the respondents. Ethical consideration were highly regarded in the conduct of the research activities. Formal consents were secured and data management activities conform with the Data Privacy Act of 2012.

A researcher-made instrument was used, comprising the personal profile and the shocks and stressors experienced by them. Focus group discussion was employed in gathering qualitative data.

In the analysis of quantitative data, descriptive statistics such as frequency and percentages were used while thematic analysis was employed in the qualitative data.

RESULTS AND DISCUSSION

Profile of the respondents

The aqua-marine processors in Aparri, Cagayan usually dry the following: *Lepturacanthus savala* (burussawit), *Trichiurus lepturus* Linnaeu/big hairtail (espada), *Engraulis encrasicolus*/anchovies (dilis), spider shrimp/*Nematopalaemon tenuipes* (aramang).

Respondents are female-dominated (63.76 percent) which is common in the fishing industry (Koralagama, 2017). Although women are not the main actors in aquaculture, they contribute to the post-harvest aquaculture industry such as fish processing (Girei, 2018). Both female and male processors share the same tasks, from carrying the containers, soaking in salt water, spreading them on the drying net, gathering of sun dried products, to packing. The bulk of aqua-marine processors are in

their middle to old age, the oldest is a 75-year old. There are just a handful of them who are quite young with only 4.35 percent belonging to the age bracket 18-32. When it comes to their highest educational attainment, majority (64 or 92.5 percent) are non-degree holders. Only one who happens to be the manager aqua-marine processors finished a business course. Some of the respondents enrolled in a fisheries-related course but did not finish the degree. Only five percent were able to finish college. These respondents who finish a college degree are the managers of the group.

Local aqua-marine processors in the area are divided into 11 groups. Every group has its managers. Group managers shell out the capital, organize the group, and do the decision-making. The managers are those who attained the highest education, have the capital, or are the most experienced in the group. Usually, younger relatives of the managers are being trained to be aqua-marine processors who will then be the successors if the leader is incapable of working anymore.

Shocks encountered by fish processors

In this paper, shocks are unforeseen problems that originate from external factors. The responses are analyzed either through financial or psychological factors.

Financial factor

One of the great shocks encountered by the respondents is the emergence of COVID-19 pandemic. They were not prepared to handle the situation. More so that it lasted for two years. The pandemic started in March which is the onset of the dry season. The processors had anticipated that After the rainy and dismal days, there would be brightness in their income, a time to cover the families' future expenses during the lean month season; however, with the appearance of the unanticipated pandemic, they were caught flat-footed. As the participants had said, during the pandemic, although they have good quality dried goods, the problem is a tiny market. There was scarcity of buyers which meant that few aqua-marine processors made money from the process

during the pandemic. The idea that people would not want to be in contact with others reduced sales, even though there was no indication that people believed aqua-marine resource products to be the source or transmitter of the virus. Food and Agriculture Organization of the United Nations share the same findings that the aqua-marine suffered economically during the pandemic (Food and Agriculture Organization of the United Nations, 2019).

Psychological aspect

Death of a loved one comes as a shock. This was experienced by the aqua-marine resource processors too. Losing a loved one is the deepest hurt that a person can experience. After a loved one dies, grief comes next (Mental Health America, 2024). Despite the unfavorable scenario, the processors believe that everything happens for a reason.

When in distress, aquamarine processors believe in divine intervention. In times of uncertainty when they can cling to no one, they usually utter “bahala na ang Diyos” (thy will be done), manangngaasi ni Apo (God is merciful) to convince themselves that they can survive in God’s protection and guidance. This happened during the time of Covid-19 pandemic. This behavior is a Filipino trait that ancestors had passed on to generations (Casiño, 2013; Gripaldo, 2004). Filipinos are widely known for their strong family connections or ties that bind them together even outside their inner family circle (Morillo, 2013). They treat their colleagues or co-workers (co-processors) as part of their family. This culture of affection among one’s circle is strongly seen among co-processors—a concept of “pakikipagkapwa” popularly expressed by Fr. Bulatao and Virgilio Enriquez in the psychology of “kapwa” (Enriquez, 2020). Having social support group seem to lighten the burden when one is down.

Stressors encountered by fish processors

Concerns or scenarios that processors are aware may happen are called stressors. These may be natural or man-made and may have favorable or unfavorable outcomes. Stressors are classified into two factors, economic, psychosocial and technological.

Economic factor

Various stressors are experienced by the aquamarine resource processors of Maura, Aparri, Cagayan. Auxiliary tax is a great burden to them. They need to pay an additional tax in proportion to fish exported from Aparri to another place. Currently, a can of raw fish costs ten pesos. This is an additional financial burden to them. The aqua-marine processors do not have a choice but to grab the opportunity to save the dried fish they were not able to sell for storage in Manila or Ilocos. While it is true that Ilocos is nearer, proximity-wise, but Ilocos storage does not accept goods during summer, a time when there is a lot of dried fish and crustaceans. It is not only the auxiliary tax that burdens them but including the labor cost of handling the goods.

Climate shocks (Marowa, 2022) and unpredictable weather is another factor to be considered that greatly influence processors income. Sometimes, they experience short dry season which means short drying timewhich is equivalent to shortened gain. When rainy season comes, lean pocket arrives. When rainy days come, they try to gamble in between good weather. Although they are aware it may rain but they still gamble to dry fish/crustaceans.

Another source of stress is incorrect personal forecasts on the potential volume of fish supply.

If they buy the raw fish for a relatively high price, expecting that there would be a scarcity of catch; however, after the purchase is made, there is an unexpectedly abundant catch of fish which results in low price. The transaction would result in a loss.

Even if they want more income, they lack space and containers for drying. If too many fish are caught, the fish processors cannot accommodate all the fish given to them for drying.

Although the fish net owners or managers usually would give the fish for drying in a consignment basis but they cannot take all the fish due to limited space.

Since many rely on a consignment basis, the price of dried fish is beyond their control.

Those who give them the raw fish for drying, control the buying price of the dried fish. Many of the aqua-marine resource driers are just laborers, they are the workers of the managers.

Lack of capital is another stressor for ordinary processors. They are unable to save money for capital, since their income is not even enough to supply their basic needs. Priority is focused on everyday survival. Most fish processor in fact emphasized, "we prioritize our family's basic need - food on the table - over our capital. However how can we save for capital if our earnings is not even enough to cover our basic needs."

Making a good judgment whether it will rain or not the next day is crucial. There are instances when fish to be dried is given in the afternoon. The time when they cannot fully dry the fish on that same day. The number of days for fully dry depends on the kind of fish.

Hairtail takes two days, anchovies takes one and a half days, sleepmouth fish takes two days, while spider shrimp can be dried in a day. During wet season, whether the weather on the next day is favorable or unfavorable is a gamble.

Psychosocial factor

Looking at the situations from a psychosocial perspective, the ordinary aqua-marine processors get controlled by the managers. It is not only because the latter provides capital but also because of the idea of utang na loob, a typical Filipino trait (Agaton, 2017). During lean months, the managers serve as savior for the ordinary processors. They can borrow money, they can ask for help from them. Due to this scenario, the ordinary processor will then feel indebted. When good days come, it is the right time for the procesors to pay back their debt by being loyal, by staying with the managers.

The situation of the managers and the ordinary aquamarine resource processors can be further explained using Abraham Maslow's hierarchy of needs. The psychological needs are in the higher stages, while the basic needs are situated in the lower

ones. The managers provide for the "basic need" of the regular aqua-marine processors during lean seasons. In this instance, the managers fulfill the lower stage. While it is true that the ordinary aqua-marine resource processors feed the managers' higher need; their psychological need - the need to be needed, this is not noticed by the managers. Only the former acknowledges the contribution of the latter. The researcher quoted the processors saying, "When we were in need, they readily helped us. We will not leave them. We're ashamed to do that." Another participant stated, "when my child got sick, we borrowed money from them, they readily helped us."

Technological factor

The researcher observed that the aqua-marine processors utilized only two techniques of aqua-marine resource preservation: these are sundrying and fermenting. These are the techniques that they repeat on doing which they believe they have expertise because of experience. They know by heart the bulk of fish to be dried or fermented and the corresponding amount of ingredients they need to add.

There are a number of food preservation methods, such as freezing, smoking, salting (Yasin, 2018) but they are either ignorant of them, have not received the necessary training, or were taught about them ten or more years ago.

External assistance

The respondents relied not only on the knowledge and strategies they have been traditionally doing, but also relied on their own resources. No one had mentioned, seeking help from government agencies such as Department of Agriculture, Department of Trade and Industry or from the Municipal Local Government.

Adapting to shocks and stressors

The COVID-19 pandemic came as a shock to the fish processors. They were not prepared for possible ways to market their goods. They relied on their managers in the marketing aspect.

Their managers and leaders were not prepared either. Storing their good in Manila, and displaying their

goods in the dried fish stalls in the market were their ways of coping. Some with a rudimentary understanding of digital marketing promoted their fish products on social media. “our relatives who are staying with us and have knowledge on social media tried to market our dried goods but still the sales is poor because people are afraid to wander”

This mechanism was ineffective because people were scared of contracting the virus during the delivery of orders.

Due to a lack of personal capital, fish processors resort to consignment transactions. “We do not have money for capital, we only pay after we have sold the dried fish/spider shrimp.” The owner of raw fish and the fish driers would agree on how much the fish would cost after sun-drying. During summer, this scheme is effective, however, during gloomy weather, it is a great gamble on their part. A good weather today does not guarantee of a good weather the next day. Once the aquamarine resources are not fully dried within the day or two, their market value depreciates. The quality of dried goods are classified into classes. Class A is guaranteed of the highest price while class C pegs the cheapest.

Plenty supply of fish causes both favorable and unfavorable feelings to them. Favorable in the sense that it creates possibility of additional gain, however, the time delivery matters. If the raw resources are given in the morning the processors have enough time for sun drying.

During this time, limited market becomes the problem. The managers of the group would then resort to storage Anticipating that during the rainy season, the price will increase, the food processors would store the dried fish in Manila. Although it is costly, at least there is an assurance of a profit.

The only food processing practiced by the aquamarine processors in the area are sun drying and fermenting. They lack knowledge of other ways of food processing. Although some of the respondents had enrolled in aquamarine-related courses, either

they were not able to finish the course, or they learned the process decades ago.

Seeking God’s intervention when in distress is a common scenario. According to them, it is better to gamble than to wait for nothing. “we will gain if it will not rain; it’s better to gamble than to be idle. God is merciful, If someone gave their catch for drying, we accept knowing that God will not abandon us. God is merciful. We were able to send our children to school living decently.”

The processors believe that the Almighty had never left them in times when they are struggling- that they are able to survive because of His intervention.

CONCLUSION

Shocks and stressors among aqua-marine resource processors are generally inevitable, with these they resort to various ways of coping. Clinging to divine intervention is their most evident coping whether on shocks and stressors. They lack knowledge on various techniques in aqua-marine resource preservation or processing and also lack equipment in doing it.

RECOMMENDATIONS

The study recommends organizing the fish processors, assisting the group in seeking equipment and livelihood from government agencies, as well as educating them on business strategies including other ways of food processing toward a more efficient and effective technology. Modernization of their fish processing technology is highly recommended.

The proponent has drafted an extension program responding to the findings of the study. The program focuses on honing individual aqua-marine processes thru capacity-building activities, organization and registration of a processors group to SEC and DTI, forging collaborations and partnerships, and sustaining activities with the organization and partner agencies.

Further studies including supply-value chain analysis of processed aqua-marine products, as well as documenting, marketing and packaging practices need to be looked into.

ACKNOWLEDGMENTS

The researcher acknowledges the contribution of the following in finishing this study: Maura Local Government Unit for allowing the researcher in conducting the study; the Maura aqua-marine processors for their cooperation during the data gathering; Cagayan State University for the funding support provided; Cagayan State University at Aparri Research Development and Extension Office for the technical assistance, and significant inputs for the improvement of this study.

REFERENCES

- Agaton SI.** 2017. Vantage points of utang na loob. *Social Ethics Society Journal of Applied Philosophy*.
- Cabugao I.** 2024. Challenges in the processing, production, and marketing of the dried fish industry. *International Advanced Research Journal in Science, Engineering and Technology*.
- Casiño T.** 2013. Mission spirituality and authentic discipleship. *Mission Spirituality and Authentic Discipleship* (Seoul, 2009).
- Ehsanul Karim MM.** 2018. Improvement of dried fish products through using a mechanical fish dryer. *The Bangladesh Journal of Fisheries Research*, 91–99.
- Enriquez VG.** 2020. *Kapwa: A core concept in Filipino social psychology*. Cambridge University Library.
- Esan LJ.** 2012. Goldratt's theory applied to the problems associated with the mode of transportation, storage and sale of fresh fruits and vegetables in Nigeria. *Journal of African Research in Business & Technology*.
- Fayzur Rahman M.** 2024. Livelihood analysis of people involved in fish-drying practices on the southwest coast of Bangladesh. *Water*.
- Food and Agriculture Organization of the United Nations.** 2015. Artisanal fishing meaning. Retrieved November 28, 2024, from <https://www.google.com/search?q=artisanal+fishing+meaning>
- Food and Agriculture Organization of the United Nations.** 2019. Impact on fisheries and aquaculture. Retrieved September 25, 2024, from <https://www.fao.org/2019-ncov/q-and-a/impact-on-fisheries-and-aquaculture/en>
- Girei AA.** 2018. Gender role of women in fisheries operations in the fishing communities of Doma Dam of Doma Local Government Area of Nasarawa State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*.
- Gripaldo R.** 2004. *Bahala na: A philosophical analysis*.
- House of Representatives 19th Congress.** 2024. Lawmakers back hike in DA budget for 2025. Retrieved August 12, 2024, from <https://www.congress.gov.ph/media/view/?content=5395&title=LAWMAKERS+BACK+HIKE+IN+DA+BUDGET+FOR+2025>
- Koralagama D, Gupta J, Pouw N.** 2017. Inclusive development from a gender perspective in small-scale fisheries. *Current Opinion on Environmental Sustainability*.
- Marowa D, et al.** 2022. Climate shocks and women's livelihood in Zimbabwe: A case study. *Journal of Biodiversity and Environmental Sciences (JBES)*, 166–183.
- Md Jabir Al Mehedi AS.** 2020. Status of drying fish, marketing channel and associated problems in the Kuakata coast of Patuakhali district, Bangladesh. *Asian-Australasian Journal of Bioscience and Biotechnology*, 48–59.
- Mental Health America.** 2024. Bereavement and grief. Retrieved September 2024, from <https://www.mhanational.org/bereavement-and-grief>

Morillo HM. 2013. Views and values on family among Filipinos: An empirical exploration. Asian Journal of Social Science 5.

Philippine Statistics Authority. 2023. Fisherfolks and farmers remain have highest poverty incidences among basic sectors 2021.
<https://www.psa.gov.ph/content/fisherfolks-and-farmers-remain-have-highest-poverty-incidences-among-basic-sectors-2021>

United Nations Department of Economic and Social Affairs Sustainable Development. 2024. Retrieved from <https://sdgs.un.org>

Wills SC. 1985. Stress, social support, and the buffering hypothesis. Psychological Bulletin.

Yasin R. 2018. Organoleptic assessment after different processing techniques. International Journal of Biosciences (IJB), 207–215.