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Profitability of spiny lobster (*Panulirus* spp.) puerulus collection in Palawan, Philippines

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ABSTRACT

Understanding profitability is crucial when engaging in any fishery business venture. The collection of spiny lobster puerulus has recently caught the interest of many fisherfolks in the province of Palawan, but information regarding its profitability is wanting. This study determined the profitability of puerulus collection based on the information given by two collectors, one from barangay (Bgy.) Rizal, Roxas and another one from Bgy. San Juan, Aborlan. Information such as the cost of materials, operating expenses, and the monthly catch were gathered with a guide questionnaire. The return on investment (ROI) were based on sales under the prevailing and regulated buying prices. Both collectors invested nearly PHP 100,000 in fabricating 1,000 – 2,000 units of cement discs and for operating the traps for either six or seven months. Under the prevailing and regulated buying prices, only the collector in Roxas had positive total net profits (PHP 13,490 and PHP 182,640) and ROI (15% and 198%), respectively. Local ordinances are needed to assist and protect the puerulus collectors from income loss caused by variable buying prices from traders. The collectors may explore using cheap and equally effective puerulus traps to reduce investment costs.

Keywords: analysis, bioeconomic, regulated buying price, monthly catch, unstable buying prices

INTRODUCTION

In most aquaculture enterprises, seedstocks mostly produced from hatchery propagation are those with shorter larval phases such as shrimps, finfishes, and mollusks (Barnard et al. 2011). In spiny lobster (*Panulirus* spp.), seedstocks solely come from the wild (Priyambodo and Jaya 2009; Jones 2010, 2018; Jones et al. 2019) since hatchery propagation of the species remains a big challenge (Barnard et al. 2011).

Although production from laboratory tank experiments is already successful (Jones 2009), the high production cost for commercialization (Jones 2018) and the long larval phase, which involves 20 instars to reach the postlarval puerulus stage are the major constraints (Barnard et al. 2011; Jones 2018).

In Vietnam, where the first aquaculture of spiny lobster was developed in the 1970s, the seedstocks of *Panulirus ornatus* (Fabricius, 1798) and *Panulirus homarus* (Linnaeus, 1758) are still collected



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mainly within the coastal areas of the country (Jones 2010; Dao and Jones 2015). However, because of overexploitation due to the expanding lobster farms, the occurrence of diseases, the seasonality of wild seedstock settlement (Jones 2010, 2018; Priyambodo et al. 2020), and the shortage of wild seedstock have led to the importation from neighboring countries such as Indonesia and the Philippines (Macusi et al. 2019; Setyanto et al. 2019; NFRDI 2020; Priyambodo et al. 2020; Mecha et al. 2022). With the attractive price for puerulus, the collection of wild seeds has become popular and is considered a lucrative livelihood in various coastal areas in Indonesia and the Philippines (Petersen et al. 2013; Macusi et al. 2019; Mecha et al. 2022). A single puerulus in Indonesia can cost more than USD 1.00 (average USD 1.34; Petersen et al. 2013), while in Davao Oriental, Philippines, the price ranges from USD 1.81 to USD 4.54 (Macusi et al. 2019), and USD 1.44 to USD 3.60 in Palawan (Mecha et al. 2022).

Puerulus collection and grow-out aquaculture are lucrative industries in Indonesia with average returns to a collector of approximately IDR 51 million per year (USD 5,900 per year) and a return on investment of approximately 4.1:1 (Petersen et al. 2013). However, there are no known profitability studies that only focus on puerulus collection since it is mixed with the overall aquaculture fishery (Petersen and Phoung 2010; Petersen et al. 2013; Apriliani et al. 2021). In the Philippines, Macusi et al. (2019) reported that a puerulus collector in Davao Occidental, Philippines, could earn an average monthly income of USD 167-366 during peak season (March-May), but the capital and investment used by the fishers in fabricating and operating gears were not evaluated. Profitability refers to the ability of the business to make a profit which reflects the strength of the business performance (Zhang and Wen 2017). According to Jones (2010), a profitable economic basis is crucial for establishing the spiny lobster industry and for its expansion.

In Palawan, the spiny lobster puerulus collection started in 2019 (Mecha et al. 2022), and become popular in 2020 due to high buying price for white and black (pigmented) puerulus. However, data on its monthly collection in each identified municipality (see Mecha et al. 2022) remained unavailable and no profitability study had validated the certainty of puerulus collection as a lucrative source of livelihood. Hence, this study was conducted to determine the cost, revenue, and profit from puerulus collection, which could be used as a basis for crafting local policies toward a profitable puerulus fishery industry. Specifically, this study aimed to determine the following; cost and return analysis, monthly puerulus catch and prevailing buying prices, and the Return on Investment (ROI) using the prevailing and regulated buying prices.

METHODS

Study Sites

The study was conducted in conjunction with two different projects about livelihood and coastal management conducted in various barangays of two municipalities in northern and southern Palawan. Among the barangays, three localities were purposively selected namely Bgy. Rizal in the municipality of Roxas in northern Palawan and two barangays (Isaub and San Juan) of Aborlan in southern Palawan (Figure 1). These barangays were selected due to the existing puerulus collection in the area (Mecha et al. 2022).

Data Collection and Respondent

Key Informants (KIs) were among the participants who attended the seminars on livelihood opportunities on 10, 26, and 27 September 2021. A total of eight KIs (all were puerulus collectors; one in Bgy. Rizal, Roxas; three in Bgy. Isaub, and four in Bgy. San Juan, Aborlan) were personally interviewed with the aid of a guide questionnaire. Written consent approval was firstly secured before the interview. The eight KIs were purposively selected as they engage in puerulus collection. The questionnaire sought to obtain information about the methods used in puerulus collection and the expenses for the fabrication of traps, installation and operation. Information on monthly catch and buying prices of white and pigmented puerulus were also obtained. Of the eight KIs, only one collector from Bgy. Rizal, and one from Bgy. San Juan had provided complete information, particularly on monthly catch and buying prices. The information from these two KIs was used as the basis for estimating the profitability of the spiny lobster puerulus collection.

Cost and return analysis. All materials, quantities, prices, and operating costs were encoded and computed using MS Excel. The estimated material cost (EMC) was calculated based on the estimated number of materials (M) used by each KI collector multiplied by the selling prices (SP) of puerulus during the collection period in 2021 (Formula 1). The operating cost for trap fabrication, installation, harvesting, maintenance, and repair was also provided based on the number of persons involved, total hours of work rendered, and given wages per hour or day based on the PHP 300 minimum salary in the area. The depreciation cost (DC) was determined using the Straight-Line Method (Formula 2) by subtracting the EMC from the estimated salvage value (SV) of all materials used and dividing by its lifespan for six and seven months per year of collection in Bgy. Rizal and Bgy. San Juan, respectively. The total collection cost (TCC) was obtained by adding the total fixed-material investment cost (TFC) and total operating cost (TOC) (Formula 3).

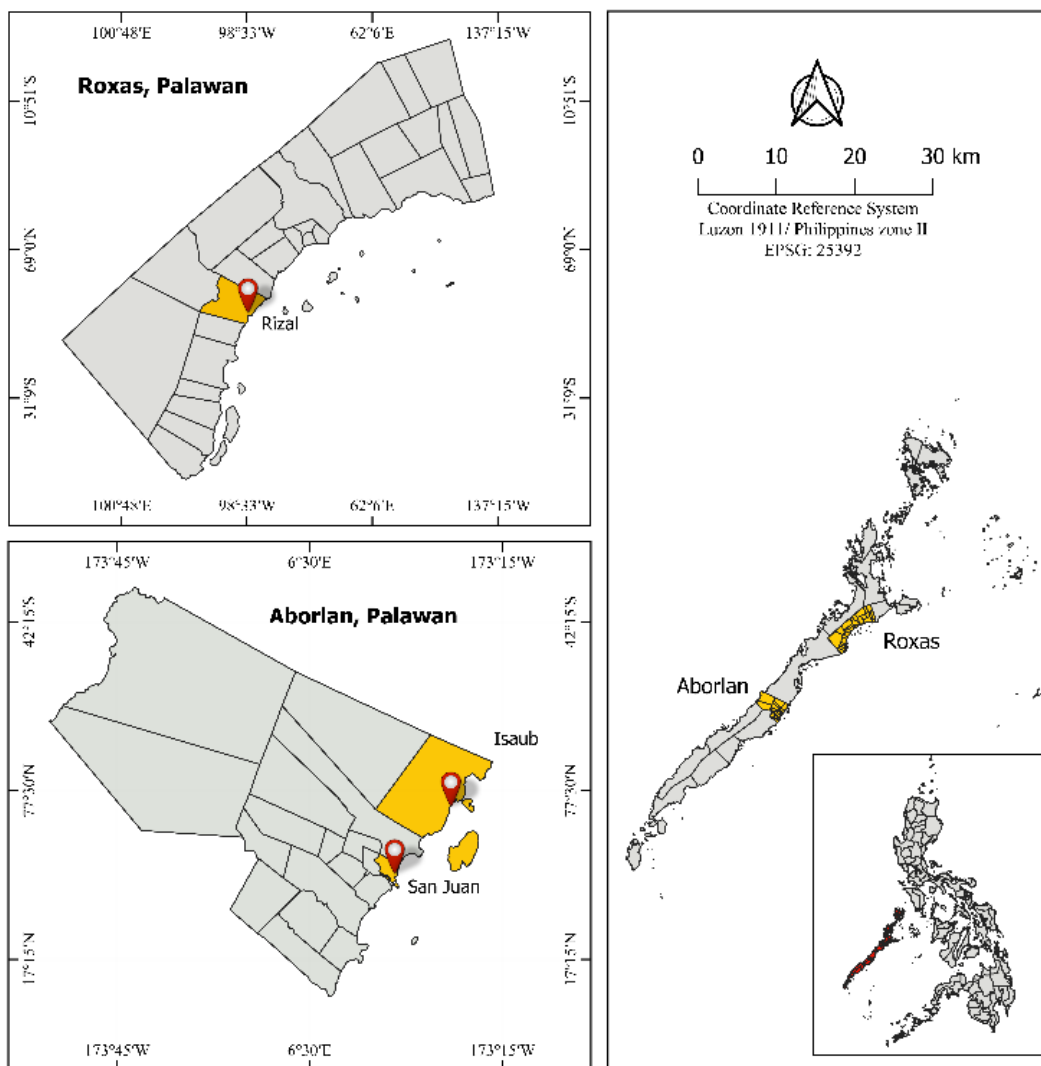


Figure 1. The three coastal barangays (Rizal, Isaub, and San Juan) in the municipalities of Roxas and Aborlan, Province of Palawan.

$$\text{Estimated Material Cost (EMC)} = M \times SP \quad \text{Formula 1}$$

$$\text{Depreciation Cost (DC)} = \frac{\text{EMC} - \text{SV}}{\text{lifespan of materials}} \quad \text{Formula 2}$$

$$\text{Total Collection Cost (TCC)} = \text{TFC} + \text{TOC} \quad \text{Formula 3}$$

Monthly puerulus catch and buying (prevailing) prices. The number of puerulus caught per month per KI was plotted in a graph along with the number of traps used to determine the relation of monthly catch to the number of traps. Also, it was used to determine the abundance of puerulus settlement per locality. The prevailing buying prices per stage of puerulus were also plotted in a graph per locality.

Profitability. To determine the monthly revenue (MR) of the collectors, the buying prices (BP) (prevailing and regulated) were multiplied by the

number of puerulus (NP) caught per month (Formula 4). The prevailing buying price was obtained from the prices of puerulus per category in 2021 as provided by the two KIs. The regulated buying price was based from the Provincial Ordinance No. 2475 series of 2020 and applied to both white and pigmented puerulus. These buying prices were used to determine if the collector per locality has a positive or negative ROI. Meanwhile, the monthly profit (MP) was obtained by subtracting the monthly collection cost (MCC; see Table 1) from the MR (Formula 5). Lastly, the ROI was computed based on the total net profit (TNP) for 6 or 7 months of collection season divided by the $\text{TCC} \times 100$ (Formula 6).

$$\text{Monthly Revenue (MR)} = \text{BP} \times \text{NP} \quad \text{Formula 4}$$

$$\text{Monthly Profit (MP)} = \text{MR} - \text{MCC} \quad \text{Formula 5}$$

$$\text{Return on Investment} = (\text{TNP}/\text{TCC}) \times 100 \quad \text{Formula 6}$$

Data Analysis and Interpretation

All data collected from two puerulus collectors were separately encoded and analyzed as they differ in terms of the number of traps, prices of materials, labor cost, monthly puerulus catch, and buying price.

RESULTS

Cost and Return Analysis

Although both KIs used the stake-hanging method, they differed in terms of the number of traps and other materials. The puerulus collector from Bgy. Rizal, Roxas used 14 sacks of cement and 1 m³ (~40 sacks) of sand for the 1,000 concrete disc type traps (1

cement:3 sand) having 25 cm diameter with 5 cm thick dimension (one-side is perforated), and 100 bamboo poles for installation of traps (Table 1). Overall, the puerulus collector in Bgy. Rizal spent about PHP 92,360 with monthly fixed investment and operating costs of PHP 13,602 and PHP 8,410, respectively (Table 1).

Meanwhile, the puerulus collector from Bgy. San Juan, Aborlan utilized 31 sacks of cement and 217 sacks of sand for the 800-2,200 concrete disc-type traps (1 cement:7 sand) with larger dimension (15 cm diameter and 13 cm thick; both-sides are perforated) than the collector from Bgy. Rizal (Table 2). Overall, the puerulus collector from Bgy. San Juan spent about PHP 93,760 with monthly fixed investment and operating costs of PHP 11,519 and PHP 5,800, respectively (Table 2).

Table 1. Cost and return analysis of puerulus collection in Bgy. Rizal, Roxas, Palawan for the six months of collection season.

Particulars	Quantity	Unit price/ wage (PHP)	Lifespan/ Duration	Total amount (PHP)
Fixed Investment (Trap Fabrication (1,000 concrete disc type; 25 cm diameter with 5 cm thick) and Trap Installation (Stake-hanging method))				
Cement (one sack can produce 71 concrete discs)	14 sacks	300	6 months for 2 years (6 months/ year)	4,200
Sand (1 m ³) ~40 sacks (3 sacks per sack of cement)	1 m ³	1,700		1,700
Bamboo ("Tiring" type)	100 poles	120	6 months	12,000
Rope #6 or 3-mm diameter	40 rolls	350	6 months for 2 years (6 months/ year)	14,000
Trap fabrication (@PHP 350 per day for 5 days per collection season)	2 persons	350	5 days	3,500
Trap installation (@PHP 350 per day for 5 days per collection season)	2 persons	350	5 days	3,500
Miscellaneous (snacks, transport fare, others)	2 persons	300	5 days	3,000
Total investment costs				41,900
Monthly Investment Cost (Depreciation of materials + 6 months dividend from the trap fabrication and installation and miscellaneous)				5,192
Depreciation cost (Total cost of product-salvage value for 6 months of collection season for 2 years)				3,525
Operating Cost				
Harvest (6 hours per day @ PHP 58 per hour for 10 days per month per season)	2 persons	3,480	6 months	41,760
Maintenance and repair (@PHP 350 for 1-day cleaning per month for 6 months)	3 persons	350	6 months	6,300
Miscellaneous (snacks, transport fare, others)	2 persons	200	6 days	2,400
Total operating cost				50,460
Monthly operating costs (Total operating cost for 6 months of collection)				8,410
Monthly collection costs (Monthly investment cost + Monthly operating cost)				13,602
Total collection cost (Investment cost + Operating cost)				92,360

Table 2. Cost and return analysis of puerulus collection in Bgy. San Juan, Aborlan, Palawan for the seven months of collection season.

Particulars	Quantity	Unit price/ wage (PHP)	Lifespan/ Duration	Total (PHP)
Investment Cost (Trap Fabrication (800-2200 concrete disc type; 15 cm diameter with 13 cm thick) and Trap Installation (Stake-hanging method))				
Cement (one sack can produce 70 concrete discs)	31 sacks	200	7 months for 2 years (7 months/ year)	6,200
Sand (7 sacks per sack of cement)	217 sacks	20		4,340
Bamboo ("Bayog" type)	160 poles	30		4,800
Rope #12 or 6-mm diameter (for installation of bamboo posts)	7 rolls	240		1,680
Rope #12 or 6-mm diameter (1 roll for 70-disc traps)	31 rolls	240		7,440
Trap fabrication (70-disc per day @PHP 350 days for 31 days)	2 persons	350	31 days	21,700
Trap installation (@PHP 350 days for 5 days)	4 persons	350	5 days	7,000
Total investment cost				53,160
Monthly Investment Cost (Depreciation of materials + 7 months dividend from the trap fabrication and installation and miscellaneous)				5,719
Depreciation cost (Total cost of product-salvage value for 6 months of collection season for 2 years)				1,619
Operating Cost				
Harvest (3 hours per day @PHP 50 per hour for 10 days per month)	2 persons	1,500	7 months	21,000
Maintenance and repair (@PHP 350 per day twice a month for 7 months)	4 persons	350	14 days	19,600
Total operating cost				40,600
Monthly operating cost (Total operating cost for 7 months of collection season per year)				5,800
Monthly collection costs (Monthly investment cost + Monthly operating cost)				11,519
Total collection cost (Investment cost + Operating cost)				93,760

Monthly Puerulus Catch and Buying Prices

Data showed that puerulus collection in two localities has different starting periods of settlement. Collection in Bgy. Rizal started in March while in Bgy. San Juan was in February with peak of the collection in May and March, respectively (Figure 2). The puerulus collector from Bgy. Rizal, Roxashad a higher monthly catch ranging from 200-600 individuals (ind.) using the 1,000 concrete disc traps (Figure 2) compared to the puerulus collector from Bgy. San Juan, Aborlan, that used a total of 800-2,200 concrete disc traps which only caught 30-200 ind. puerulus per month (Figure 2).

During the beginning of collection season in each locality, the white and pigmented puerulus had a higher prevailing buying price ranging from PHP 110 (USD 1.98) and PHP 70 (USD 1.26) in Bgy. Rizal to PHP 130 (USD 2.33) and PHP 80 (USD 1.44) in San Juan (Figure 3). During the lean season, the prevailing buying prices for white and pigmented puerulus dropped to PHP 35 (USD 0.63) and PHP 15 (USD 0.27) in both areas, respectively (Figure 3).

Profitability

The buying system of puerulus in two localities involved the separation of white from pigmented puerulus since these two have different buying prices. Forty percent (40%) of catch were considered white, while 60% were pigmented. In addition, the estimated total revenue and net profit of puerulus collectors from Bgy. Rizal, Roxas, for six months of collection season were around PHP 105,850 and PHP 275,000, and PHP 13,490 and PHP 182,640 using the prevailing and regulated buying prices, respectively (Table 3). The puerulus collector in Bgy. Rizal earned 15% ROI using the prevailing buying prices, while 198% for the regulated buying price (Table 3).

Meanwhile, the puerulus collector from Bgy. San Juan, Aborlan had estimated a total revenue of PHP 18,920 and PHP 59,000 for prevailing and regulated buying prices, respectively (Table 4). However, the collector had a negative net profit and ROI (Table 4) during the seven months of collection season.

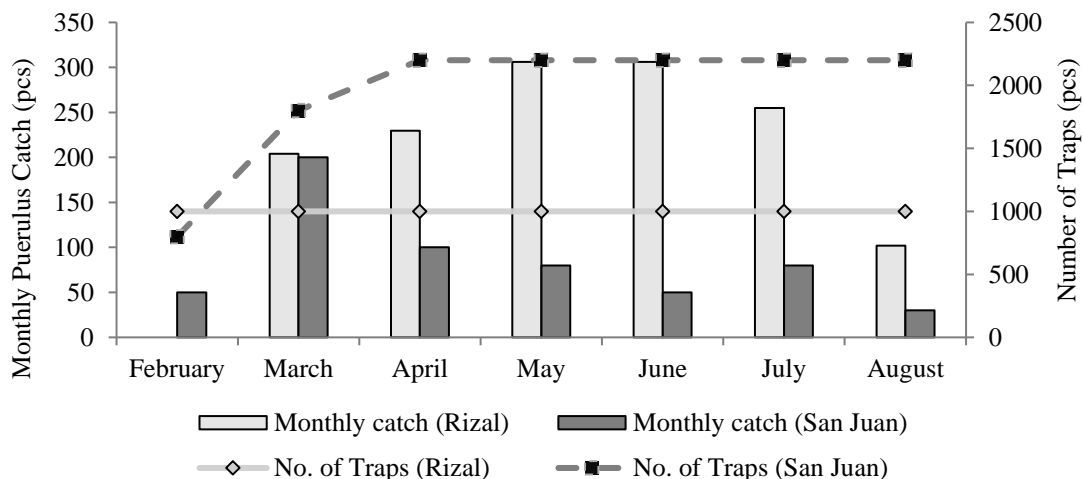


Figure 2. Monthly puerulus catch and the number of traps used by the collector from Bgy. Rizal, Roxas, and Bgy. San Juan, Aborlan, Palawan.

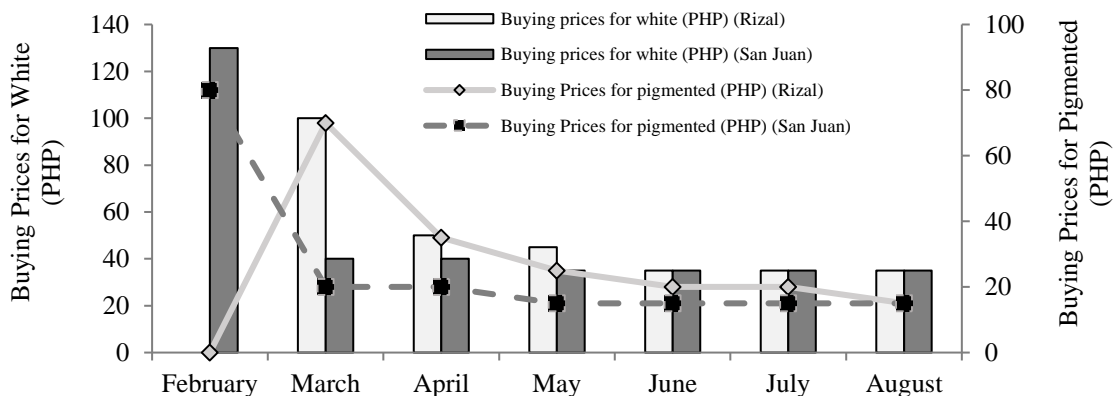


Figure 3. Monthly prevailing buying prices of puerulus (white and pigmented) in Bgy. Rizal, Roxas, and Bgy. San Juan, Aborlan, Palawan.

Table 3. Total revenue and profit of puerulus collector from Bgy. Rizal Roxas, Palawan using the prevailing and regulated buying prices. USD 1 = PHP 55.39 based on the real-time dollar-to-peso exchange of Google Finance in August 2022.

Monthly catch of puerulus per category	Number of puerulus	Prevailing buying prices (PHP)			Regulated buying price (PHP)		
		Price of puerulus	Monthly total revenue	Monthly net profit	Price of puerulus	Monthly total revenue	Monthly net profit
March							
White	160	110	34,400	20,798	100	40,000	26,398
Pigmented	240	70					
April							
White	180	50	18,450	4,848	100	45,000	31,398
Pigmented	270	35					
May							
White	240	45	19,800	6,198	100	60,000	46,398
Pigmented	360	25					
June							
White	240	35	15,600	1,998	100	60,000	46,398
Pigmented	360	20					

Monthly catch of puerulus per category	Number of puerulus	Prevailing buying prices (PHP)			Regulated buying price (PHP)		
		Price of puerulus	Monthly total revenue	Monthly net profit	Price of puerulus	Monthly total revenue	Monthly net profit
July							
White	200	35	13,000	-602	100	50,000	36,398
Pigmented	300	20					
August							
White	80	35	4,600	-9,002	100	20,000	6,398
Pigmented	120	15					
Total			105,850	13,490		275,000	182,640
ROI (%)				15			198

Table 4. Total revenue and profit of puerulus collector from Bgy. San Juan, Aborlan, Palawan using the prevailing and regulated buying prices. USD 1 = PHP 55.39 based on the real-time dollar-to-peso exchange of Google Finance in August 2022.

Monthly catch of puerulus per category	Number of puerulus	Prevailing buying prices (PHP)			Regulated buying price (PHP)		
		Price of puerulus	Monthly total revenue	Monthly net profit	Price of puerulus	Monthly total revenue	Monthly net profit
February							
White	20	130	5,000	-6,519	100	5,000	-6,519
Pigmented	30	80					
March							
White	80	40	5,600	-5,919	100	20,000	8481
Pigmented	120	20					
April							
White	40	40	2,800	-8,719	100	10,000	-1,519
Pigmented	60	20					
May							
White	32	35	1,840	-9,679	100	8,000	-3,519
Pigmented	48	15					
June							
White	20	35	1,150	-10,369	100	5,000	-6,519
Pigmented	30	15					
July							
White	32	35	1,840	-9,679	100	8,000	-3,519
Pigmented	48	15					
August							
White	12	35	690	-10,829	100	3,000	-8,519
Pigmented	18	15					
Total			18,920	-74,840		59,000	-34,760
ROI (%)				-80			-37

DISCUSSION

Cost and Return Analysis

This study revealed that a spiny lobster puerulus collector using a stake-hanging method with 1,000-2,200 concrete disc traps spent PHP 92,360 to PHP 93,760 for six and seven months of collection season, respectively. Due to insufficient literature about expenses and operating costs of some fishery activities such as gleaning (collection of marine species with commercial value either by hand or with the aid of various tools in coastal areas during low tide) and fishing, the cost and return analysis of this study was compared to the seaweed farming which is one of the livelihood sources in the coastal area. According to Alin et al. (2015), the operation of a 1-hectare seaweed

farm with four rounds of harvest has expenditures of at least PHP 34,800, indicating that the six- or seven-month operation in puerulus collection has much higher total expenses. Despite the high expenses required for spiny lobster puerulus collection, a lot of people are lured to engage in this livelihood possibly because of its high price and abundance of puerulus (Mecha et al. 2022), which is also reflected in the short harvest time (3-6 hours per day) and the number of monthly puerulus catch of two collectors from Bgy. Rizal and Bgy. San Juan (Figure 2). Fishers are marginally poor, and their daily survival depends on the availability of cash resources in the coastal area, which could provide them with a good and immediate income for their day-to-day needs (Macusi et al. 2019). In addition, puerulus collection only needs a few

materials for the fabrication of traps, installation, maintenance, and repair, while seaweed farming needs more time, hard labor, and some facility, such as a drying area and a suitable location to establish the farm (Alin et al. 2015). Furthermore, the decline of productivity in some fishery resources, which are mostly done by fishers like gleaning requires more labor, while fishing needs higher capital and effort due to the declining wild stocks (Macusi et al. 2017). These reasons have caused many fishers to look for an alternative livelihood (Muallil et al. 2011, 2014) such as the puerulus collection. According to Macusi et al. (2019), fishers engaged in other income-generating activities to meet their family needs.

In addition, most fishers engaged in livelihood business have no records of their expenses and income, and mostly rely on their memory due to the lack of proper training in entrepreneurial skills. According to Aladejebi and Oladimeji (2019), record keeping of all expenses is crucial for the business to track and adjust the expenditures. This explains the high total collection cost of two puerulus collectors since they were not able to record and track the expenses in the whole collection season as mentioned during the interview. The use of traps made of cheaper and locally available materials is highly recommended to reduce the cost of fabrication thereby increasing profitability. Thus, determining the cost using other traps and methods in spiny lobster puerulus in Palawan would be beneficial as it would provide more information, which is crucial for the selection of a particular collection operation with minimal expenses involved.

Monthly Puerulus Catch and Buying Prices

The abundance of settling puerulus in coastal areas is highly dependent on the physical characteristics of the coast and water movement (Dao et al. 2015; Priyambodo et al. 2020). The embayment characteristics of Roxas, Palawan could trap the pueruli carried by the ocean current from open water into Green Island Bay. This explains the high monthly puerulus catch in Bgy. Rizal ranging from 200 to 600 ind. month⁻¹ (Figure 2; Table 3). Meanwhile, the short continuous coastline of Aborlan in which the water current continuously moves to the southeast or northeast of Palawan explains the low monthly catches that range from 50 to 200 ind. (Figure 2; Table 4). In Lombok, Indonesia, the volume of puerulus settlement on the west coast and southeast also differed due to the abovementioned conditions of the coastal area (Priyambodo et al. 2020). The collection season in Bgy. San Juan started a month earlier than in Bgy. Rizal. This variation which was also reported in Vietnam and Indonesia is attributed to the differences in water current (Bahrawi et al. 2015; Jones et al.

2019). Despite the seasonality, it is still important to have continuous monthly/yearly puerulus catch monitoring per municipality to provide more robust information on the catch trend of spiny lobster puerulus in Palawan, which is crucial in managing the wild stock population.

The high buying price of the puerulus in Palawan only happened at the start of the collection season, then it dramatically dropped every month until the end of the season which contradicts the law of supply and demand wherein price increases with less supply (Fernando 2021). The unstable price has also been reported in Balete Bay, Davao Oriental, however, in the opposite way, where the buying price starts at PHP 100 (USD 1.81) at the beginning of collection (March) and continuously increases to PHP 250 (USD 4.54) at the succeeding peak seasons (April to May; Macusi et al. 2019). According to Macusi et al. (2019), some suppliers and operators of spiny lobster aquaculture from the CARAGA region ventured into the Davao Oriental for the puerulus supply. This competition makes the puerulus in Balete Bay fetch a high price. In Palawan, there is only one foreign middleman involved in buying puerulus (see Mecha et al. 2022) since there are no local fishers that venture into the spiny lobster aquaculture using the puerulus stage. This may explain the low buying prices despite the existing Provincial Ordinance No. 2475 series of 2020 that regulates the buying price. However, this still needs further investigation, as the system of buying and trading of spiny lobster puerulus in Palawan involves several foreign middlemen and buyers in each municipality.

Profitability

Unlike the puerulus collector from Bgy. Rizal, Roxas that only had two monthly losses based on net profit using the prevailing buying prices (Table 3), the collector from Bgy. San Juan, Aborlan had negative net profit and ROI on both buying prices (prevailing and regulated; Table 4) for the whole collection seasons. Both puerulus collectors failed to include the operating cost in their profitability computation, hence they assumed that the collection is still profitable because it has high prevailing buying prices from the start of collection season. Assuming that the operating costs are excluded in the computation as practiced by some novices in business, the collector from Bgy. Rizal would obtain a much higher net profit (PHP 73,950) and ROI (232%) using the prevailing buying prices (Table 5). Meanwhile, a collector from Bgy. San Juan still has a negative net profit and ROI following such scheme (Table 5). This shows that removing the operating cost does not guarantee a positive profit and ROI which is a big loss for the collector. Since the collector was unable to

Table 5. Comparison of total net profit and Return on Investment with and without operating costs of two puerulus collectors using the prevailing buying prices.

Collectors	Net Profit (PHP)		Return on Investment (%)	
	With operating cost	Without operating cost	With operating cost	Without operating cost
Rizal, Roxas, Palawan	13,490	73,950	15	232
San Juan, Aborlan, Palawan	-74,840	-5,540	-80	-23

track the expenses and earnings from the collection activities for the whole collection season, it become unnoticeable. According to Nelson et al. (1976), to have a positive and high profit, expenses must be reduced.

In addition, the positive and negative net profit and ROI of two puerulus collectors using the prevailing prices show that the abundance of wild seedstocks in a certain site is one of the factors to have a positive net profit and ROI. This is because the prevailing price and capital of the two collectors are almost the same. Similar to the profitability of spiny lobster grow-out aquaculture in Indonesia, where a person with higher seedstocks can yield a higher profit and ROI compared to those with lower seedstocks (Petersen et al. 2013). Hence, collectors in Bgy. San Juan and other localities in Palawan with existing collection activities should find a suitable site with a high abundance of puerulus settlement and use cheaper biodegradable trap materials to have a good net profit and ROI. This would not only lessen the capital needed for the collection but also help lessen the pollution in the marine environment. On the other hand, a follow-up profitability study involving the use of other collection methods as indicated in the previous study (see Mecha et al. 2022) is suggested with more sources of data from different localities in Palawan.

In conclusion, only the regulated buying price (PHP100) for white and pigmented puerulus showed a positive net profit and ROI for localities with abundant wild seedstocks. While the prevailing buying prices resulted to a very little profit for the collector from Bgy. Rizal, Roxas. Establishing a cooperative or fisherfolk association for puerulus collectors may help address the existing problems. Establishment of an organization is crucial for the proper distribution of benefits like the case of lobster production in Belize (Huitric 2005), assist to market their collected puerulus (Macusi et al. 2019) at regulated prices, and implement the maximum harvest per collector per month to minimize the exploitation of wild seedstocks. Moreover, a follow-up study dealing with more KIs from different localities including their socio-demographic profile is also suggested to provide robust data on the financial capacity, expenses, revenue, and net profit of the puerulus collectors in Palawan. In addition, venturing into grow-out aquaculture utilizing the wild seedstocks of Palawan

could help reduce the fishing pressure for the wild population of spiny lobsters. This would also help increase the buying prices since there might be a possible increase in the demand and competition among the spiny lobster farmers for the wild seedstocks like the case in Davao Oriental (Macusi et al. 2019). However, proper management of the puerulus fishery must be considered at the soonest to avoid overharvesting and ensure the long-term benefits of collectors and those involves in its fishery.

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ETHICAL CONSIDERATIONS

A written consent form was secured before the conduct of interview to eight Key Informants.

No animals were captured in this study.

DECLARATION OF COMPETING INTEREST

The authors declare that there is no competing interests among them.

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