Socio-Economic Profile of the Sea Urchin Fishermen in Nalvo, Sta. Maria, Ilocos Sur

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Abstract

The study was conducted to assess the impact of the sea urchin industry in Nalvo, Sta. Maria, Ilocos Sur, whether it has increased family income and improved technological procedures in sea urchin farming or not. It also aimed at finding out prevailing problems encountered and it tried to look into the factors contributing to such problems and suggested solutions.

With a total number of 67 sea urchin fishermen respondents, it came out that sea urchin farming indeed effected an increase of their monthly income. It was also found out that financial as well as material inputs were provided by the local officials, and that no technical assistance was provided because it is the academe (University of Northern Philippines) and the Bureau of Fisheries and Aquatic Resources (BFAR) which extend technical assistance.

Lack of technical assistance in terms of proper stocking density and manner of feeding came out as the main contributing factors to the different problems encountered by the sea urchin fishermen in the locality.

Introduction

Background of the Study

The sea urchin *(Tripneustes gratilla)* or cake urchin which is locally known as maritangtang in Iloko, is considered as one of the most expensive delicacies in the Philippines and in some countries of Asia.

Result of the study of Roa and Pasamonte in 1997 as mentioned by Domingo and Corrales (2002) showed that the sea urchin resource in Bolinao,

Pangasinan was overexploited which resulted to the collapse of the sea urchin fishery in 1992. However, Juinio-Meres et al. (1998) suggested grow-out culture as a resource management tool. Hence, the sea urchin cage culture came to be.

In the province of Ilocos Sur, people along the coastal municipalities usually collect this echinoderm species abundantly from the wild and eat the roe or gonad. Nowadays, local fishermen claim that these important marine resources are no longer as abundant as before.

In Barangay Nalvo, Sta. Maria, Ilocos Sur, *T. gratilla* was collected abundantly from its coastal waters. Fisherfolks collect and sell them in the market or to buyers who directly go to their place. But over-exploitation of these echinoderms has led to its depletion.

A couple who came all the way from Olango Islands in Cebu initiated the sea urchin cage culture in Nalvo, Sta. Maria, Ilocos Sur. The couple further shared what they knew to their neighbors. Technical knowledge regarding sea urchin cage culture in Nalvo, Sta. Maria, Ilocos Sur was the result of a study by Domingo and Florendo in 1997, then assistance was extended by the Bureau of Fisheries and Aquatic Resources and the Don Mariano Marcos Memorial State University (DMMMSU). That single sea urchin cage has become hundreds of cages now. Hence, the sea urchin fishery in the place was born. It has now become a livelihood for most of the people in the area.

No data on the socio-economic profile of the sea urchin fishermen in Nalvo, Sta. Maria, Ilocos Sur has been made available, hence, this study. Results of the study may serve as baseline information for researchers and for people in other coastal towns who would also like to engage in sea urchin cage culture.

Objectives

This study aimed to conduct an assessment of the sea urchin industry in Nalvo, Sta. Maria, Ilocos Sur.

In particular, it sought to determine:

1. the socio-economic profile of the sea urchin fishermen,
2. the culture methods used,
3. the marketing practices, and
4. the impact of sea urchin farming to the respondents.

Review of Related Literature

Sea urchins are bottom-feeding echinoderms that are found in every ocean around the world. The colors range from dark purple to red. They are covered with short to long spines. The diameter of the shell can get up to 6 inches. The average weight of a sea urchin is one pound. These echinoderms are harvested for their internal roe, a uni that is considered an aphrodisiac. Uni is known as a delicacy in Japan and sushi bars worldwide. Uni has a very sweet flavor as it melts in one's mouth. (Encarta Reference Libarary, 2004)

Tripneustes gratilla locally known as swaki, santol-santolan, and maritangtang belongs to Phylum Echinodermata. This organism is characterized by its purplish body surrounded with white and orange spines. It is benthic in its adult stage and mainly found in seagrass or seaweed beds and reef flats. (Domingo and Corrales, 2002)

Juinio-Menes et al (2001) mentioned that sea urchin fishery stocks are under threat of overfishing throughout the world. In the Philippines, *T. gratilla* is the most commercially exploited species, being one of the major sources of livelihood in coastal villages particularly in the Ilocos and Bicol regions.

Trinidad-Roa and Pasamonte, as mentioned by Domingo and Corrales(2002),conducted an assessment of the sea urchin natural population in Bolinao, Pangasinan in 1997. Results showed that the sea urchin resource is overexploited. The UP-MSI then initiated a seasonal ban on sea urchin collection during the assumed period of peak spawning from December to February. This regulation was put into force only two years, after which the open-access fishery of the resource continued. Due to continued overexploitation and commercial harvesting, the sea urchin fishery collapsed in 1992.

After the collapse of the sea urchin fishery in Bolinao in 1992, Juinio-Menes,et al as mentioned by Domingo and Corrales (2002) suggested grow-out culture of sea urchins to explore alternative resource management strategies to manage local sea urchin fisheries. This could particularly aid in the recovery of depleted population by creating artificial aggregation where the sea urchin brood stock can spawn freely within a greater likelihood of fertilization success.

According to Levilan (1991), grow-out cultures could function as reproductive reserves. The cages could facilitate larval recruitment because the aggregation of adults in the cages increases the probability of egg fertilization. In aggregation, sea urchins often spawn en masse, and once a sea urchin starts releasing gametes, others quickly follow.

In a study on the growth of *T. gratilla* using two types of feeds by Domingo and Florendo (1997), results showed that the growth performance of the sea urchin fed with pure *Sargassum spp.* was significantly higher than those fed with mixed seaweeds.

All these studies show that so far, no data on the socio-economic profile of the sea urchin fishermen in Nalvo, Sta. Maria, llocos Sur has been reported.

Methodology

The study made use of the survey method of research. Data were gathered through the direct interview technique and indirect way through the questionnaire method. It also made use of the descriptive method of research in the presentation of data.

Of the total 98 sea urchin fishermen in Nalvo, Sta. Maria, Ilocos Sur, only 67 of them wanted to be interviewed.

For the statistical part, frequency and percentage distribution were employed in determining the profile of the respondents.

Results and Discussion

A. Socio-economic Profile of Respondents

Table 1. Age-sex distribution of respondents

Age Group	**Male**	**Female**	Total	%
70– 79	1		I	1.5
60 –69	3		3	4.5
50 – 59	9	2	11	16.4
40 – 49	6	2	8	11.9
30–39	17		17	25.4
20–29	21		21	31.3
Below20	6		6	9.0
Total	63	4	67	
% *of_Total*	**94.03**	**5,97**		100.00

Table 1 presents the age-sex distribution of respondents. There were more male sea urchin fishermen who were 63 in number (or 94.03%) than females who

were 4 in number (5.97%). From the male respondents, majority belonged to the top age bracket of 20-29 (31.3%) followed by those from 30-39 (25.4%) years of age. This implies that the sea urchin fishermen are already matured or responsible enough to find ways to improve their standards of living.

Table 2. Civil status of respondents by sex

Civil Status	Male	Female	Total	%
Single	29		29	43.3
Married	34		34	50.7
Widow/er	2	2	4	6.0
Total	**65**	2	**67**	**100.00**

Civil status is also an important factor in the profile of the respondents and this is presented on Table 2. There were 34 married male respondents and they represented 50.7% of the total number of respondents. Married people are deemed more serious in their outlook in life, the fact that they have families to support, unlike the single ones. There were also four or 6.0% who were widow/ers. This implies that their being single parents must have triggered them to find other means of livelihood to support their families.

Table 3. Distribution of respondents by number of children in the family

Number of Children	No.	%
Six 6)	4	6.0
Five(5)	**8**	11.9
Four (4)	8	11.9
Three 3)	6	9.0
Two(2)	6	9.0
One (1)	5	7.4
None(o)	30	44.8
Total	**67**	**100.00**

The number of children in the family is an index of economic status. Table 3 shows that 30 (44.8%) of the respondents had none; eight (11.9%) had 5 children; eight (11.9%) had 4 children; six (9.0%) had 3 children; six (9.0%) had also 2 children; five (7.4%) had l; and four (6.0%) had 6. This implies that majority of the respondents were oriented on family planning.

Table 4. Distribution of respondents by number of children who can help augment household expenditures

Number of Working Children	No.	%
Four (4)	55	7.5
Three 3)	5	7.5
Two (2)	7	10.4
One (1)	9	13.4
None	41	61.2
Total	67	100.00

Although most of the respondents have a number of children to support, it is also interesting to note that a number of these can also help augment household expenditures which is shown on Table 4. It can be gleaned from the table that nine (13.4%) had I child each who could help in the household finances; seven (10.4%) had 2; five (7.5%) had 4; and five (7.5%) had 3. This implies that although majority of the respondents did not finish a college degree, they could still provide certain training to their children enabling them to earn so that they can assist in the financial needs of the family.

Table 5. Educational attainment of respondents

Educational Attainment	No.	%
Did not finish elementary	2	3.0
Elementary school graduate	10	14.9
Did not finish high school	30	44.8
High school graduate	10	14.9
Voe/Tech school graduate	6	9.0
Did not finish college	7	10.4
College graduate	2	3.0
Total	67	100.00

It is reflected on Table 5 that majority (30 or 44.8%) had gone as far as high school although they did not finish the course; 10 (14.9%) finished high school; 10 (14.9%) of the respondents also finished elementary; seven (10.4%) had gone to college although they did not finish the course; six (9.0%) finished vocational/technical courses; two (3.0%) finished college; and two (3.0%) also did not finish elementary education.

Table 6. Distribution of respondents by their major sources of income

Sources of Income	No.	%
Fishing	46	68.7
Fanning (crop production)	2	3.0
Meat/Fish Vendor	3	4.5
Tricycle driving	2	3.0
Sea urchin farming	9	13.4
Not specified	5	7.4
Total	67	100.00

The respondents' economic profile is determined by their primary and secondary sources of income. Table 6 representing the respondents' primary sources of income shows that 46 (68.7%) were engaged in fishing activities; nine (13.4%) were specifically into sea urchin farming; three (4.5%) were meat/fish vendors; two (3.0%) were tricycle drivers; two (3.0%) were engaged in farming/crop production; and the rest were not specified.

Table 7. Distribution of respondents by other sources of income

Other Sources of Income	No.	%
Fanning	21	31.3
Tricycle driving	8	11.9
Vegetable/fish vendor	4	6.0
Sea urchin fanning	7	10.4
Construction worker	1	1.5
None	6	9.0
Not specified	20	3.0
Total	67	100.00

Other sources of income of the respondents are shown on Table 7. As reflected on the table, 21 (31.3%) were engaged in farming or crop production; eight (11.9%) as tricycle drivers; seven {10.4%) engaged in sea urchin farming; four (6.0%) were vegetable/fish vendors; one (1.5%) was a construction worker; and the rest did not specify their other sources of income, while six (9.0%) had none.

This table reflects the values of Filipinos - that they are hardworking and industrious people.

Table 8, Distribution of respondents as to the number of years they have been engaged in sea urchin farming

Number of Years	F	%
20	1	1.5
12	2	3.0
10	2	3.0
9	1	1.5
8	I	1.5
7	1	1.5
6	2	3.0
5	3	4.5
4	22	32.8
3	10	14.9
2	20	29.8
I	2	3.0
Total	67	100.00

It is reflected on Table 8 that most (22 or 32.8%) have been engaged in sea urchin farming for four years; 20 (29.8%) have been into sea urchin farming for two years; 10 (14.9%) for three years; three (4.5%) for 5 years; two (3.0%) each for 6 years, 1 year, 10, years, and 12 years; and the rest, one each (1.5%) for 7, 8, 9, and 20 years. This implies that sea urchin farming is still young in the place, although a few have been engaged in the business for 7-20 years already.

Table 9. Distribution of respondents as to the number of cages owned

Number of Cages	**No.**	%
9	2	3.0
8	3	**4.5**
7	1	1.5
6	5	7.4
5	5	7.4
4	11	16.4
3	17	25.4
2	15	22.4
1	8	11.9
Total	**67**	**100.00**

As shown on Table 9, 17 (25.4%) owned 3 cages each; 15 (22.4%) had 2; 11 (16.4%) had 4; eight (11.9%) had 1 each; five (7.4%) had 5 and 6 cages each; three (4.5%) had 8; and two (30%) had 9 cages each. This implies that most of the

respondents owned only a few cages, although a few owned as much as 9 cages each.

Table 10. **Weight of sea urchin** sold **per year**

Weight(kg	**NO.**	%
I 000 and above	1	1.5
800 – 999	8	11.9
600 – 799	7	10.4
400 – 599	32	47.8
200 –399	17	25.4
Below200	2	3.0
Total	67	100.00

It can be seen from Table I0 that most of the respondents (32 or 47.8%) sold from 400-599 kilograms of sea urchin per year; 17 (25.4%) sold 200-399 kilograms; eight (12.0%) sold from 800-999 kg; seven (10.4%) sold 600-799 kg.; two (3.0%) sold 90-199 kg; and one (1.4%) sold 1,000 kg. and above.

The distribution of respondents as to the number of kilograms sold per year is directly proportional to the number of cages owned. The more cages a sea urchin fisherman has, the more sea ui·chins being produced.

Table 11. Distribution of respondents as to the peak months for selling sea urchin

weight.kg	**NO.**	%
December	52	77.6
September-December	1	1.5
December-January	3	4.5
December-May	11	16.4
Total	67	**100.00**

Table 11 shows the peak months for selling sea urchins as claimed by the respondents. FiRy-two (77.6%) claimed the month of December as the peak month; 11 (16.4%) mentioned the months of December to May; 3 (4.5%) claimed December and January; and one (1.5%) of the respondents sold the most from September to December.

Table 12. Distribution of respondents as to the months with lowest sales

Months	No.	%
March	7	10.4
April	42	62.7
June	6	9.0
July-September	12	17.9
Total	**67**	**100.00**

It is reflected on Table 12 that majority (42 or 62.7%) of the respondents had lowest sales during the month of April; 12 (17.9%) claimed to have the lowest sales during the months of July-September; seven (10.4%) in March; and six (9.0%) in June. All of the above-mentioned months occurred during summer and rainy season.

Table 13. Expenses incurred every two years in sea urchin farming

Expenses	No.	%
600 and below	4	6.0
600 – 700	2	3.0
700 – 800	2	3.0
800–900	2	3.0
900–1,000	4	6.0
1 000–2,000	34	50.7
2,000–3 000	15	22.4
3,000 –4,000	3	4.5
4,000 – 5,000		1.5
Total	67	**100.00**

Expenses in the sea urchin farming include amounts used in the purchase of polyethylene net, rope, bamboo, wire, juveniles if bought, and tax P1,001-P2,000; 15 (22.4%) spent P2,001-P3,000; four (6.0%) spent about P600.00 and below and another 4 spent P901-1,000, three (4.5%) spent P3,001-P4,000; two (3.0%) each incurred expenses amounting to P601-700, P701-800; and PO1-P900; while one (1.5%) spent P4,001-P5,000.

B. Culture Methods

Table 14. Main materials for cages

Materials	No.	%
Bamboo	29	43.3
Polyethylene net	38	56.7
Total	67	100.00

Majority (38 or 56.7%) of the respondents made use of polyethylene net in constructing their cages while the rest (29 or 43.3%) made their cages out of bamboo.

Table 15. Life span of cages

No. of Years	**No.**	%
4 years and above	4	6.0
3 years	23	34.4
2 years	40	59.7
Total	67	100.00

Most of the respondents (40 or 59.7%) claimed that whether the cages are made of polyethylene net or bamboo, *it* only took 2 years before they had to construct a new cage; 23 or 34.3% used their cages for 3 years only; while only four (6.0%) used their cages for 4 years or more. According to those who used their cages for 4 years or more, it all depended on how one takes care of his cages.

Table 16. Stocking density used/M'

No. of Years	**F**	%
401 – 500	0	
301 – 400	0	
201 –300	0	
101 – 200	0	
Not applicable	67	
Total	67	100.00

It can be gleaned from Table 16 that there was no specific density used. All the respondents stocked their cages as long as there was enough space. This implies the lack of technical assistance extended to the sea urchin farmers.

Table 17. Number of cropping/year

No. of Cropping/s	F	%
2	31	46.2
I		
Continuous	36	53.73
Total	**67**	**100.00**

Majority of the respondents (36 or 53.73%) continuously stock their cages the whole year round. They sell whenever there **is a** buyer, and they stock their cages with juveniles as long as there is enough space.

Table 18, Sources of juveniles

Source	**No.**	%
Collect from the wild	11	16.4
Buy	56	83.6
Total	67	100.00
b. If bought, where		
Sta. Maria	11	16.4
San Esteban	21	31.3
San Juan, Ilocos Sur	6	9.0
Santiago	25	37.3
La Union	4	6.0
Total	**67**	100.00

Table 18 shows the sources of juveniles, and if bought, the particular place where the juveniles are bought.

Majority (56 or 83.6%) bought juveniles from other fishermen in the other coastal municipalities of Ilocos Sur. They had to buy because stocks from the wild are becoming scarce. Only 11 (16.4%) collected from the wild.

For those who bought the juveniles, most (25 or 37.3%) bought from Santiago, a nearby costal town. Four or 60% bought juveniies from as far as La Union. Prices range from 50 centavos to P2.00 depending on the size of the organisms.

Table 19, Food given to the sen urchins

Food	No.	%
Pure *Sargassum* spp	42	62.7
Mixed *Sargasso*_ spp of seagrasses	25	37.3
Total	67	100.00
Frequency of Feeding		
Every day	5	7.4
Every other day	38	56.8
3 x a week	17	25.4
2x a week	2	3.0
Once a week	5	7.4
Total	67	100.00
Manner of Feeding		
Adlibitum	67	100.00
Total	**67**	**100.00**

Table 19 presents the type of food given to the sea urchins, frequency of feeding, and manner of feeding.

Most of the respondents (42 or 62.7%) fed the sea urchins with pure *Sargassum* spp. while *25* or 37.3% gave a diet of mixed *Sargassum* spp and seagrasses, particularly the eel grass.

In terms of the frequency of feeding, most (38 or 56.8%) fed the sea urchin every other day. Only two or 3.0% fed the organisms twice a week.

All of the respondents fed the sea urchin adlibitum.

Table 20. Frequency in **cleaning cages**

Frequency	No.	%
Every day	3	4.5
Every other day	30	44.8
3x a week	8	11.9
2x a week	6	9.0
Once a week	10	14.9
2x a month	8	11.9
Do not clean at all	2	3.0
Total	**67**	**100.00**

Most *of* the respondents (30 or 44.8%) cleaned their cages every other day; 10 or 14.9% did it once a week. Two (3.8%) of them did not clean their cages at all.

Table 21. Time when stocks are harvested

Time	No.	%
Full moon	I	1.5
Anytime	66	98.5
Total	**67**	**100.00**

C. Marketing Practices

Table 22 presents the marketing practices in terms of where to sell the sea urchin and preference of buyers.

Table 22. Where to sell the sea urchin

Place	No.	%
Own Town	61	91.0
Other towns/provinces	6	9.0
Total	**67**	**100.00**
Preference of Buyers		
With Test	**62**	**92.5**
Roll only	**5**	**7.5**
Total	**67**	**100.00**

D. Impact Assessment of Sea Urchin Farming

Table 23. Comparative table showing the estimated monthly income before and after engaging in sea urchin farming

Estimated Monthly Income	Before		After	
	No.	%	No.	%
Below P1,000.00	43	64.2	0	
P1,000 – P3,000	19	28.4	55	82.1
Above P3,000	5	7.4	12	17.9
Total	**67**	100.00	67	100.00

The impact assessment of sea urchin farming can be made through an analysis of the respondents' estimated monthly income before and after engaging in sea urchin farming. This can be seen on Table 23. Gleaning from the table, we can see that the trend of income tends to have gone up from the lower income bracket which implies that the respondents' monthly income had increased. This **is a** real implication that their income had improved after engaging in sea urchin farming.

Table 24. Extent of contribution of sea urchin farming to the increase of income

Extent	No.	%
Very much	57	85.1
Much	9	13.4
Moderate	0	
Little	1	1.5
Very Little	0	
Total	**67**	100.00
Overall Mean		**4.8**
Descriptive ***Rating***		**Very High**

Table 24 gives a picture of the influence of sea urchin farming on the increase of the respondents' income. From the table, it can be seen that 57 (85.1%) reacted as Very Much; nine (13.4%) as Much; one (1.5%) as Little. Nobody resulted as Moderate and Very Little.

Table 25. Kind/form of assistance received from local officials

Assistance	No.	%
Financial	2	3.0
Technical	0	
Material Inputs	33	49.2
None	32	47.8
Total	67	100.00

Table 25 shows the kind/form of assistance the local officials extended to the sea urchin fishermen. There were 33 (49.2%) who mentioned that assistance was in the form of material inputs such as polyethylene net, ropes or bamboo. Thirty-two or 47.8% did not receive any form of assistance; two (3.0%) received financial assistance. Nobody received technical assistance from the local officials because it was given by the academe (UNP) and the Bureau of Fisheries and Aquatic Resources (BFAR).

Table 26. Problems encountered in sea urchin farming, factors contributing to the problem, and recommended solutions

Problems	No.	Factor/s Contributing to The Problem/s	Recommended Solutions
Juveniles are expensive	34	▸ Over collection in Nalvo waters that is why a few juveniles can only be collected	> Implementation of closed season ▸ Training on sea urchin breeding
Few juveniles from the wild; have to buy	41		
Materials for cage construction costly	41		LGU's/concerned agencies should help sea urchin farmers
Sargassum spp. becoming lesser in area	4	> Many sea urchin farmers uproot Sargassum for feeding }- Lack of technical knowledge on sea urchin feeding	}> Do not uproot *Sargassum spp;* get cuttings only
Cages destroyed during typhoon	62	> On sea urchin fanning especially on the proper area where to set up cages	> Ask technical assistance from concemed agencies
Lack of technical knowledge on proper procedures of sea urchin culture like proper stocking; feeding, and maintenance	46		Training on sea urchin farming by concerned agencies
Limited area for sea urchin cage culture	22	> Too many cages }- Overcrowding of cages	

It can be seen from Table 26 that the destruction of cages during typhoons dominated all the problems encountered in sea urchin farming. The factor contributory to this problem is the lack of technical knowledge on sea urchin culture. The recommended solution was to ask technical assistance from concerned agencies.

Lack of technical knowledge on proper procedures of sea urchin culture like proper stocking, feeding and maintenance ranked 2'', and recommended solution was a training on sea urchin culture by concerned agencies.

"Sargassum spp. limited in the area" was the problem encountered the least. The factor contributory to this problem was that the sea urchin farmers uprooted sargassum for feeding. It was recommended that they only uproot sargassum.

Conclusion and Recommendation

Sea urchin farming/culture can uplift the economic conditions of the sea urchin fishermen in Nalvo, Sta. Maria, Ilocos Sur as evidenced in the increase of their income.

Since no technical assistance on proper stocking density, feeding, and maintenance has ever been extended to the fishermen, it is highly recommended that concerned agencies particularly the Bureau of Fisheries and Aquatic Resources and the Local Government Unit take part in the proper management of the resource.

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