

NURSERY AND GROW-OUT CULTURE OF
Snubnose Pompano
(*Trachinotus blochii*, Lacepede)
IN BRACKISHWATER PONDS

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Foreword

Pompano is an ideal fish for farming due to its exceptional taste, high market value, fast growth rates, adaptability to various aquaculture systems, relative disease resistance, and in view of the increasing demand for premium seafood.

Since 2007, the SEAFDEC/AQD has conducted extensive research on pompano farming, beginning with the development of breeding and seed production technologies. The research center has made significant progress in these areas and also in the nursery and grow-out phases. Pompano health, nutrition, and feed development were also studied and articles have been published in reputable science journals. Furthermore, SEAFDEC/AQD has published laymanized manuals on pompano cage nursery culture in 2012 and hatchery seed production in 2014.

This latest aquaculture extension manual, "Nursery and Grow-out Culture of Snubnose Pompano (*Trachinotus blochii*, Lacepede) in Brackishwater Ponds," is another addition to the collection of farming technologies that are ripe for adoption by fish farmers. Valuable information on species biology, site selection, pond preparation, stocking, rearing techniques, and economics are included in this publication.

With its twin manual, "Nursery and Grow-out Culture of Snubnose Pompano (*Trachinotus blochii*, Lacepede) in Marine Cages," these publications are available to equip farmers with knowledge for cultivating snubnose pompano in both brackishwater ponds and marine cages. They are based on research and field trials, and aim to support fish farmers, industry stakeholders, and enthusiasts. It is my hope that all these further drive the growth and success of pompano aquaculture.



Dr. Sayaka Ito
Deputy Chief, SEAFDEC/AQD

About the Manual

This manual, titled “Nursery and Grow-out Culture of Snubnose Pompano (*Trachinotus blochii*, Lacepede) in Brackishwater Ponds,” includes culture techniques and good practices developed through extensive research done at the Aquaculture Department of the Southeast Asian Fisheries Development Center. The manual also tackles a viable technology that can guide fish farmers in raising pompano in brackishwater ponds.

Main sections included in this manual: 1. Biology, 2. Site Selection, 3. Pond Preparation, 4. Pond Maintenance, 5. Stocking of Fish, 6. Rearing (Nursery and Grow-out), and 7. Economics.

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1 *Introduction*

The Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC/AQD) has been at the forefront of developing aquaculture technologies for economically-important fish species in the Philippines. Snubnose pompano (*Trachinotus blochii* Lacepede), locally known as “pompano,” “damis lawin,” or “apahan” is a relatively new fish species for aquaculture in the country. Pompano can be reared in ponds and is a good substitute for grouper, snapper, and other high-value fish species. It is an attractive fish to grow in brackishwater ponds because it adapts well to the culture environment. It also readily accepts formulated diet and has good disease resistance. The meat characteristic of pompano is sought after by restaurants and consumers. However, the availability of this species in the market is still limited since its breeding and culture technology has not yet been widely disseminated in the country.

Over the years, SEAFDEC/AQD has developed the breeding, hatchery, and grow-out protocols of pompano through extensive research. These technologies enable and support the sustainable farming of pompano in the country. This manual presents a working technology that can guide fish farmers in growing pompano in brackishwater ponds.

2 *Biology*

General Features

- **Body shape:** The shape is commonly fusiform, displaying a typical oval shape, and elongated towards the posterior end.
- **Color:** Head and body are usually silver and dark blue gray at the top. The snout and lower half of the body of adults is oftentimes golden orange. The fins are golden yellow with dusky tips while the pectoral

fins are darker with fish greater than 75 cm. The second dorsal fin is dark and the fin lobe is dusky orange. The anal fin has a dusk orange hue.

- **Other features:** The snout is broadly rounded. Both jaws have bands of small villiform teeth.



Figure 1. Snubnose pompano, *Trachinotus blochii*

Pompano belongs to the family *Carangidae*, which is considered a broad class of predatory pelagic fishes extensively scattered worldwide. The species of the genus *Trachinotus* are mostly considered excellent food fish and are listed in commercial fisheries indices. In their natural environment, pompanos feed on small shrimps, crabs, amphipods, and other benthic invertebrates. They require an energy-rich diet to support their high metabolic demand activity (*i.e.* continuous swimming in the wild and in captivity). They have a short digestive tract which translates into a short retention time, thus the ingredients used in the diet formulation should be highly digestible.

Pompanos are found in coastal (as an adult) and brackishwater (as larvae and juvenile) habitats. Due to their relatively efficient growth, superior meat quality, and capacity to easily adapt to formulated feeds, pompanos are considered a suitable species for commercial aquaculture.

3 *Site Selection*

The following factors should be carefully considered when selecting a location for pond aquaculture: abiotic factors (e.g. water supply, meteorological and hydrological conditions, and soil characteristics), pond inputs, and manner of operation.

1. **Water**

Water samples should be analyzed for their physico-chemical (*i.e.* temperature, salinity, turbidity, suspended solids, pH, dissolved oxygen, and biological oxygen demand) and biological characteristics (*i.e.* microorganisms that are carriers of disease and abundance of plankton as primary productivity) (**Table 1**).

2. **Weather**

Data on precipitation, temperature, humidity, and monsoon patterns in the vicinity should be weighed.

3. **Soil**

Visual and chemical analysis (*i.e.* pH, phosphorus, calcium, magnesium, dissolved organic matter) of soil should be conducted. The type of soil should be sandy clay to clay loam which is favorable for operation and to facilitate the growth of natural food in the pond bottom. Areas with a thick layer of organic soil should be avoided since it contributes to increased water seepage.

4. **Inputs**

Fry, feeds, fertilizers, and other farm implements should be available near the area of operation.

5. **Operation**

The land area will depend on the type of culture system (*i.e.* extensive or intensive) and production targets.

Table 1. Optimum water parameters for pond culture of pompano

Parameters	Range
pH	7.5–8.3
Dissolved oxygen	4–8 ppm
Salinity	25–33 ppt
Temperature	26–32 °C
Ammonia nitrogen	< 0.02 mg/L
Alkalinity	> 80 ppm
Transparency	35–45 cm
Water color	brown-green

4 *Pond Preparation*

The pond soil should be dried thoroughly until the top soil has cracked, and then removed (**Figure 2**). This method will oxidize the organic matter and allow the growth of natural food. The process also eradicates unwanted species and microorganisms that are vectors of diseases. In addition to sun drying, tea seed powder (15–20 mg per liter) can be applied or a combination of ammonium sulfate (21-0-0) and hydrated lime (Ca (OH)₂) at a 5:1 ratio (**Figure 3**).

Tilling is done for soil nutrients to be made available in the production of primary food in the pond. The area is leveled and the pond bottom is constructed to slope towards the gate for easy draining during water management or harvest.

An inorganic fertilizer (46-0-0 or urea) is applied at a rate of 18–20 kg per hectare to enhance primary food productivity. Water is gradually admitted during high tide until the pond water level is at 80–100 cm.



Figure 2. Draining of ponds in preparation for drying to oxidize organic matter and remove unwanted species



Figure 3. Application of hydrated lime to sterilize and increase nutrient availability in the ponds

5 *Pond Maintenance*

Dike

Leakages and the integrity of the structure should be thoroughly checked. Canals should be clear of debris and dredged to an appropriate depth for an uninterrupted flow of water (**Figure 4**).



Figure 4. Clearing of debris in canals to provide efficient drainage system

Gates

To increase the efficiency of water exchange, biofoulers (e.g. oysters, barnacles, and algae) should be removed. Dilapidated gates and screens should be replaced to restrict the entry of unwanted species (**Figure 5**).



Figure 5. Repair of pond gates and dikes to prevent water seepage

Pond equipment

Life support systems such as water pumps and paddlewheels are on standby and will only be used during emergency conditions (i.e. low dissolved oxygen) (**Figure 6**).

The nursery facility is integrated into the pond grow-out system (**Figure 7**). Bamboo catwalks are installed for ease of movement during feeding and monitoring. A hut may also be constructed as a temporary shelter for personnel as well as interim storage for daily feed rations.



Figure 6. Provision of paddle wheel in the course of low dissolved oxygen in the pond

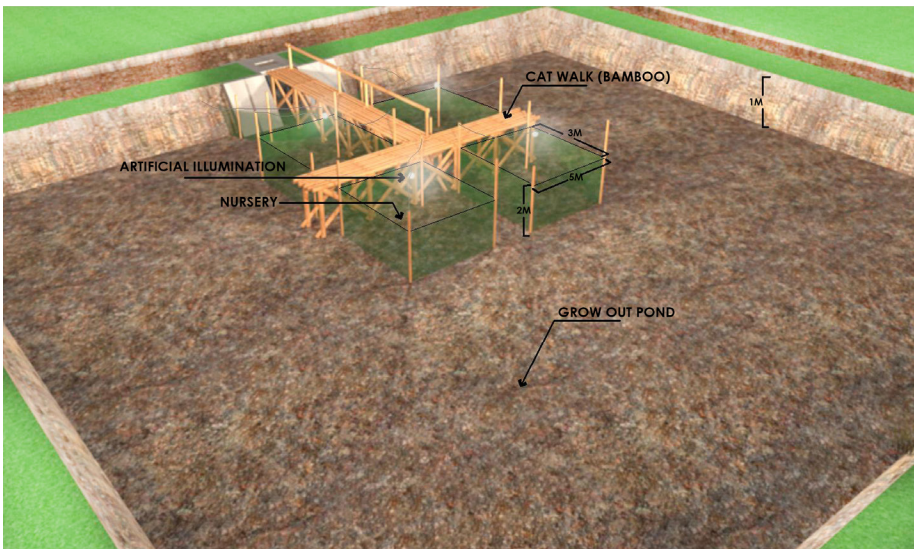


Figure 7. An illustration of a pompano pond integrated with a nursery and grow-out facility

6 *Stocking of Fish*

Selection

Pompano fry should show no signs of physical deformities and disease symptoms (e.g. viral nervous necrosis and sea lice infection). Stocks should be homogenous in size (1-g body weight or 1.5-inch body length) to avoid cannibalism between fry as well as to ensure even sizes of fish during harvest. As much as possible, animals should be weaned to feed on formulated feeds prior to stocking in ponds.

Packing and transport

Animals should not be fed 24 hours prior to packing. From the hatchery tanks, fish are harvested, counted, and settled in aerated baskets overnight prior to packing and transport early the following morning (**Figure 8**).



Figure 8. Conditioning of pompano fry in aerated baskets prior to packing and transport to reduce stress

Double-layered 20 in x 30 in plastic bags are used to pack 150–200 pompano fry (0.5 g average body weight, 1-inch average body length). The bags should be filled with oxygen and seawater (7 L) at a volume ratio of

3:1. This packing density can sustain the fish for 8–12 hours of transport (**Figure 9**). Ice tubes (250 g) wrapped in paper are inserted between the outer and inner plastic bags to reduce water temperature. The plastic bags are then packed in styroboxes (**Figure 10**).



Figure 9. Packing of pompano fry in oxygenated plastic bags



Figure 10. Plastic bags packed in styroboxes for an extended transport duration

7 Rearing (Nursery and Grow-out)

Nursery

Hatchery-produced fry need to undergo a nursery phase where they will be reared to become fingerlings fit for grow-out. Pompano fry are stocked in hapa nets (B-net; 5 m x 5 m x 1.5 m) at a stocking density of 150 fish per cubic meter (**Figure 11**). Fish should be acclimated to pond conditions (*i.e.* temperature and salinity) by gradually introducing pond water to opened container bags. The animals will be reared for 35 days or until they reach a body weight of 30 g.



Figure 11. Stocking of pompano fry gradually released in hapa nets. The fry will be reared for around 35 days

Feeding is done four times a day (0800, 1200, 1400, and 1600) by following a suggested feeding rate (**Table 2**). Lighting fixtures can be installed in the pond to concentrate small aquatic animals such as crustaceans and rotifers (**Figure 12**). These zooplanktons will serve as a supplemental food to pompano fry. This method will reduce the cost of feeding formulated diets during the nursery phase.

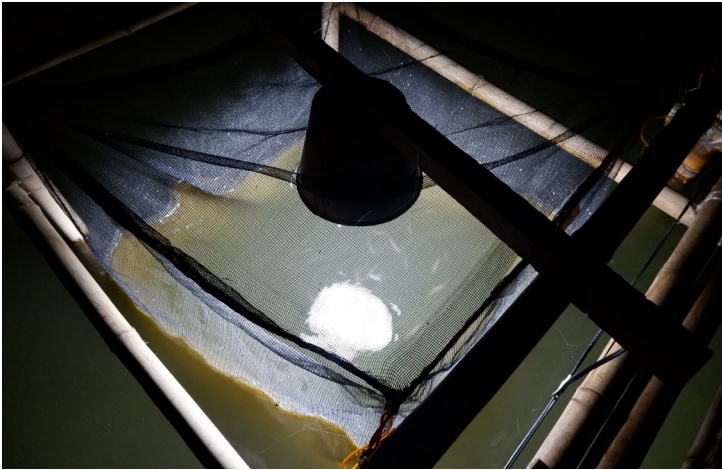


Figure 12. Artificial illumination in a nursery pond to attract natural food

Table 2. Adjusted feed rates for pompano based on the average body weight

Fish weight (g)	Feed rate (% body weight)	Size	Phase
1-30	10-8	Mash/Crumble	Nursery
31-60	7-6	Starter	Grow-out
61-90	6-5	Starter/Grower	Grow-out
91-120	6-5	Grower	Grow-out
121-210	5-4	Grower	Grow-out
211-290	4-3	Grower/Finisher	Grow-out
291-360	3-2	Finisher	Grow-out

Monitoring of stocks (*i.e.* feeding and swimming behavior) should be done frequently and thoroughly.

Grow-out

Pompano fingerlings with an average body weight of more than 30 g is transferred from the nursery hapa nets to grow-out ponds at a stocking density of two fish per square meter. To reduce stress, stocking should be performed early in the morning. It is suggested that undersized fish (less than 30 g) should not be included in the transfer. They can be returned to

the nursery nets for further rearing. The stocks are reared for about 175 days in the grow-out phase of an operation to attain a harvestable weight of ≈ 360 g.

Feeds and feeding management (Nursery and Grow-out)

The nutrient profile of feeds should meet the requirements of pompano (**Table 3**). Feed rations are divided into four parts during the nursery stage (0800, 1100, 1400, and 1700) and three parts (0800, 1100, 1400, and 1700) during the grow-out phase. Unlike other cultured fish, a pompano feeding regimen should not be “by satiation” as they tend not to cease ingesting even when full. Recording the daily feed consumption is vital as this information can provide accurate values when calculating performance parameters after harvest (**Table 4**).

Table 3. Nutrient and amino acid requirements of *Trachinotus* spp.

Nutrient	Levels
Protein	39.5–42.7 % ¹
Lipid	5.7 % ²
DP / DE ³	23–25 mg/kJ ²
Amino acids	
Methionine	1.19 % ¹
Lysine	2.4–2.45 % ¹
Taurine	1–1.5 % ¹
Arginine	2.73–2.74 % ²
Leucine	2.9–3.2% ²
Isoleucine	4.0 % ²
Valine	1.9 % ²
Histidine	1.61 % ¹
Phenylalanine	1.15 % ²
Threonine	1.39 % ²
Tryptophan	0.13 % ²

¹*Trachinotus blochii*

²*Trachinotus* spp.

³Dietary protein to dietary energy ratio

Table 4. Example of a daily feeding record to monitor feed consumption of fish

Date	Pond No.	Feed ration	Time				Total	Remarks
			0800	1100	1400	1700		Nursery
			0800	1200	1700			Grow-out

Sampling of stocks

A sample size of 5 % of the total stocks is weighed in bulk periodically (every 30 days) to monitor fish growth. Sampling data will then be analyzed for the prevailing average body weight of the fish. The average body weight is calculated using the equation below:

$$\text{Average body weight (ABW)} = \frac{\text{total weight of fish sampled}}{\text{total number of fish sampled}}$$

To optimize feed efficiency, feeding ration is adjusted after stock sampling of the average body weight and survival (**Figure 13**). Feed rate recommendations serve as a guide to improve the nutrient efficiency of feeds and may be adjusted based on the prevailing condition of the fish and the environment. The feeding behavior of pompano is adversely affected during inclement weather conditions. The feed requirement is calculated using the equation below:

$$\text{Feed requirement} = \frac{(\text{no. of stocks} - \text{mortality}) \times \text{fish mean body weight} \times \text{feeding rate}}{1,000}$$

Feed stocks should be kept in a cool and dry storage facility to prevent spoilage and extend their shelf life. The nutrient availability and palatability of the diets are highly likely compromised with the growth of molds.



Figure 13. Periodic weight sampling of fish stocks

Monitoring

Water parameters such as dissolved oxygen, salinity, pH, temperature, and turbidity should be closely monitored. When parameters are below optimum, water change should be conducted via tidal cycles or pumping during emergency cases.

Fish vitality should be checked, this is observed in the swimming and feeding behavior, physical abnormalities, and symptoms of diseases. During a suspected disease outbreak, live or fresh fish samples should be subjected to microbiological analysis. This is to ascertain the causative agent and the specific control measures to be applied.

Harvest

Fish stocks can be harvested when they attain a marketable size of 350 g. A seine net is used to aggregate fish adjacent to the dike for easy collection (**Figure 14**). To maintain optimum fish quality, pre-chilled seawater is used to immediately reduce fish flesh temperature (**Figure 15**). Prepared in a chilling tank, the recommended ice-to-fish ratio is 1:1 (by weight). The chilled fish are packed in Styrofoam boxes with sufficient ice (*i.e.* 1:1 ratio). An arrangement of a layer of crushed ice at the bottom of the container and in between rows of fish should be followed.



Figure 14. Seining of pompano during harvest



Figure 15. Harvested pompano placed on chilled ice to maintain optimum fish quality

The computation of the fish performance parameters after every harvest is critical in every pond aquaculture production. These data will allow farm operators to re-evaluate their general operating protocol, especially feed management. The performance parameters data should be recorded thereafter (**Table 5**). The following fish performance parameters are computed using the equations below:

$$\text{Weight gain (\%)} = \frac{\text{final weight} - \text{initial weight}}{\text{initial weight}} \times 100$$

$$\text{Specific growth rate} = \frac{\ln(\text{final weight}) - \ln(\text{initial weight})}{\text{no. of days}} \times 100$$

$$\text{Feed conversion ratio} = \frac{\text{total feed intake}}{\text{final biomass} - \text{initial biomass}}$$

$$\text{Survival (\%)} = \frac{\text{no. of stocks final}}{\text{no. of stocks initial}} \times 100$$

Table 5. Example of a sampling record for performance parameters

Sampling period	Pond No.	Days of Culture	ABW (g)	Mortality	Total feed intake	FCR	SGR

Growth rate of pompano reared in brackishwater ponds weighed every 30 days is presented in **Figure 16**.

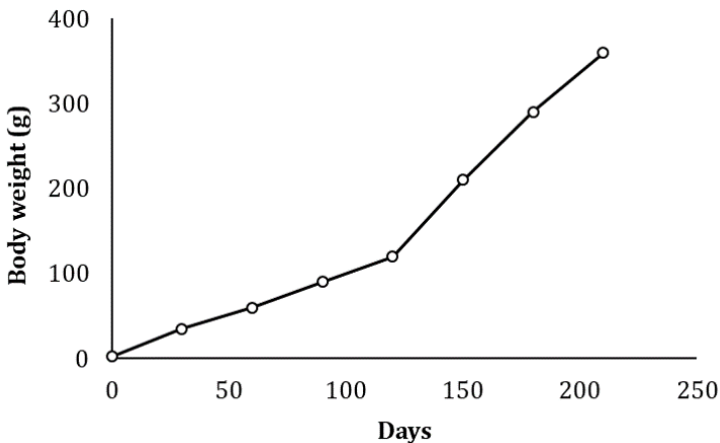


Figure 16. Growth of pompano from nursery to grow-out in brackishwater pond for 210 days

8 *Economics*

Table 6 defines the technical information of a five-year farm investment plan for pompano pond operations. The associated investment items, costs, depreciation, and the required re-investments are presented in **Table 7**. As indicated, the more liquid capital assets of the farm are expected to be used until the farm ceases to operate after five years.

From the given assumptions in **Table 6**, a cost and return analysis is provided in **Table 8** to estimate the net return of pompano grow-out operation in the pond. Also, the economic efficiency indicators are generated showing the high profitability of the single-run grow-out operation. The existing farm operation is expected to recover its initial investment cost after a single run and the estimated free cash flow could even be possibly used for another run. The break-even analysis proves that the operation could absorb changes of at most 40 % in the foregoing assumptions and remain profitable.

Table 9 provides the financial investment analysis and estimates the net income, net present value, internal rate of return, and discounted benefit-cost ratio for a 5-year operation after a 2 % annual increase in sales and a 1 % annual increase in cost are assumed. The following discounted financial indicators highlight the viability of the pompano grow-out operation in the pond.

Validated by the aforementioned information, the grow-out culture of pompano in the pond is a profitable and viable undertaking.

Table 6. Technical information in pompano pond operations

Project duration (year)	5
Culture period (days, nursery to grow-out)	210
Total pond area for stocking (m ²)	10,000
Stocking density (pcs/m ²)	2
Number of fingerlings stock per crop (pcs)	20,000
Number of pompano at harvest per crop (pcs)	17,800
Survival rate	89 %
Average body weight, final (g)	360
Average body weight, initial (g)	1
Total weight gain (kg)	6,390
Total feed consumed (kg)	12,432
Feed conversion ratio	1.94
Volume of harvest per crop	6,408
Number of crops/year	1
Volume of harvest per year	6,408
Farm-gate price per kg body weight (PHP)	350

Table 7. Investment items, costs, depreciation, and re-investments

Investment Items	Cost (PHP)	Economic Life (Year)	Depreciation (PHP)	Reinvestment in Year 3 (PHP)
Field hut	30,000	2.5	12,000	30,000
Bamboo poles for foot walk	10,000	2.5	4,000	10,000
Seine net	5,000	2.5	2,000	5,000
Water pump, 1 hp	27,000	5	5,400	
Paddle wheel, 2 hp 5 units	175,000	5	35,000	
Miscellaneous items	24,700	5	4,940	
Total (PHP)	271,700		63,340	45,000

Table 8. Cost and return analysis

Gross revenue per year (PHP) (PHP 350/kg, 6,480 kg)	2,242,800
Gross revenue per crop (PHP)	2,242,800
Cost	
A. Variable Cost	
Fingerlings (PHP 10.00/pc)	200,000
Feeds (PHP 80/kg, 12,432 kg feed consumed)	994,522
Fuel	10,000
Pond preparation (PHP 20,000/ha)	20,000
Maintenance and repairs, 5 % of investment costs	13,585
Transportation/Electricity cost	20,000
Hired labor/harvester (PHP 400/day)	4,000
Total variable cost per crop	1,262,107
Total variable cost per year	1,262,107
B. Fixed Cost	
Rent of pond (PHP 20,000/ha)	20,000
Permits and licenses (PHP 5,000/yr)	5,000
Depreciation cost	63,340
Pond aide salary (PHP 10,000/month)	70,000
Opportunity cost of own capital (2.5 %/annum)	6,793
Total fixed cost per crop	165,133
Total fixed cost per year	165,133
Total production cost per crop (PHP)	1,427,239
Total production cost per year (PHP)	1,427,239
Economic efficiency indicators	
Net income per year (PHP) (gross revenue – total cost)	815,561
Return on investment (ROI, %) (net income/investment cost) x 100	300.17 %
Return on feed cost (%) (net income/feed cost) x 100	82.01 %
Payback period, years [investment cost/(annual net income+annual depreciation)]	0.31
Break-even price (PHP/kg) (total cost/total production)	222.73
Break-even volume of production (kg/crop) (total cost/selling price)	4,078

Table 9. Financial Investment Analysis

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Gross Income (PHP)*	-	2,242,800	2,287,656	2,333,409	2,380,077	2,427,679	11,671,621
Investment Cost (PHP)	271,700	-	-	45,000	-	-	316,700
Variable and fixed cost, less depreciation (PHP)	-	1,363,899	1,377,538	1,391,313	1,405,227	1,419,279	6,957,256
Total cost investment and operating costs (PHP)**	271,700	1,363,899	1,377,538	1,436,313	1,405,227	1,419,279	7,273,956
Net income including earnings from depreciation (PHP)	(271,700)	878,901	910,118	897,096	974,851	1,008,400	4,397,665
Net Present Value (NPV, PHP)							2,950,399
Internal Rate of Return (IRR, %)							326.06 %
Discounted Benefit-Cost Ratio (DBCR) (NPV of gross incomes/NPV of costs)							1.58

*2% annual increase in sales value due to several factors such as improved operations and skills, higher survival rate, and probable price increase

**1% annual increase in cost due to probable increase in prices of materials and labor

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ABOUT SEAFDEC

The Southeast Asian Fisheries Development Center (SEAFDEC) is a regional treaty organization established in December 1967 to promote fisheries development in the region. The member countries are Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam.

The policy-making body of SEAFDEC is the Council of Directors, made up of representatives of the member countries.



SEAFDEC has five departments that focus on different aspects of fisheries development:

- The Training Department (TD) in Samut Prakan, Thailand (1967) for training in marine capture fisheries
- The Marine Fisheries Research Department (MFRD) in Singapore (1967) for post-harvest technologies
- The Aquaculture Department (AQD) in Tigbauan, Iloilo, Philippines (1973) for aquaculture research and development
- The Marine Fishery Resources Development and Management Department (MFRDMD) in Kuala Terengganu, Malaysia (1992) for the development and management of fishery resources in the exclusive economic zones of SEAFDEC member countries, and
- Inland Fishery Resources Development and Management Department (IFRDMD) in Palembang, Indonesia (2014) for sustainable development and management of inland capture fisheries in the Southeast Asian region.

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