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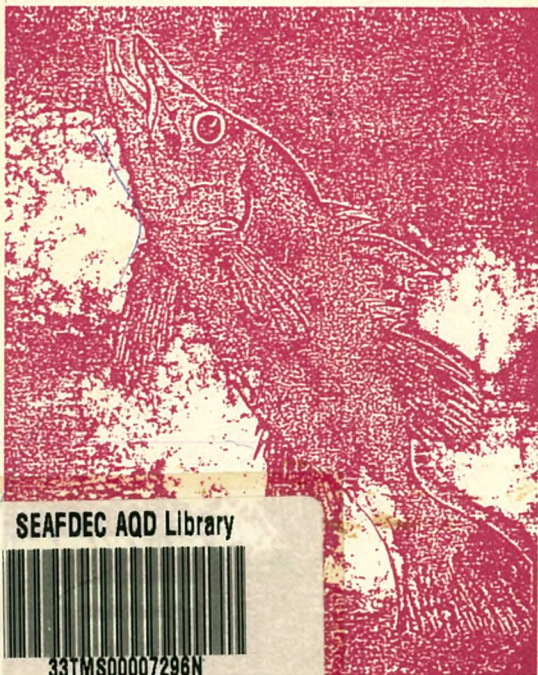


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# CULTURE OF SEA BASS



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# **CULTURE OF SEA BASS**

by

Information and Publication Unit  
Fishery Conservation and Extension Division

Department of Fisheries, Thailand

The Secretariat  
Southeast Asian Fisheries Development Center

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This paper is a translation of the Thai information and publication pamphlet entitled "Karn Liang Pla Kaphong Khao" (1978). It was translated by *Mr. Vijai Srisuwantach*, Senior Fisheries Biologist, National Inland Fisheries Institute, and further edited by the Secretariat.

## CULTURE OF SEA BASS

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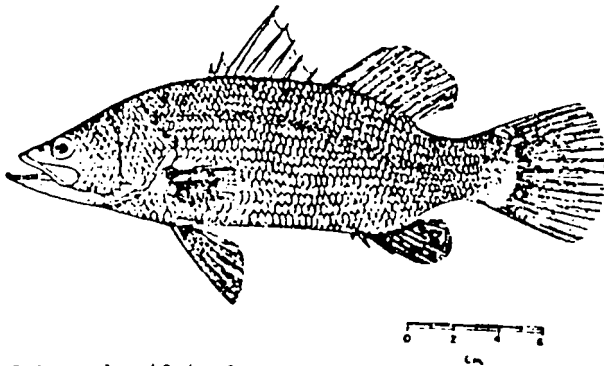
### INTRODUCTION

Sea bass or giant sea perch, known as *pla kaphong*, *pla kaphong khao*, or *pla kaphong namjerd* in Thailand, is one of the large brackishwater fish. The species is found mainly in estuaries and mangrove swamps adjacent to the sea. Sea bass is one of the economically important fishes, distributed widely along the coast in the Gulf of Thailand and the Andaman coast. It is also found in the Indo-Pacific and Australian regions.

Sea bass is an important local food fish because of its tasty and nutritious meat. It is an expensive fish compared with other species. Most sea bass sold in the market come from the natural watersheds. At present the supply is insufficient due to large demands. Since the marine capture fisheries have declined, coastal aquaculture has been fostered to compensate for the loss of fishery production from capture fisheries. Intensive promotion of sea bass culture can help to meet this objective.

## CHARACTERISTICS AND BIOLOGY

The sea bass cultured in Thailand is known under the scientific name *Lates calcarifer* Bloch. They are considered the largest in size as compared to other members of the same genera.



*Lates calcarifer* Bloch

The body form is oblong and somewhat compressed. The head is depressed, the upper profile being slightly concave. The cleft of the mouth is slightly oblique. The maxilla extends to below the posterior edge of the orbit. Villiform teeth appear on jaws, vomer, and palatine bone. The opercles are strongly denticulated. Two dorsal fins unite at their bases, the first with seven or eight spines and the second with ten to eleven soft rays. The anal fin has three spines. The caudal fin is rounded and fan-shaped. The scales are ctenoid, and of moderate size. There are 52-61 scales on the lateral line.

The species occurs in marine, brackish and fresh waters with connection to the sea. The fish find shelter and food in littoral waters and prefer slow moving clear water. They have a wide salinity tolerance and can be acclimatized to freshwater. They are extremely predacious. Their food consists mainly of other fish, shrimps, snails and worms. They are known to be cannibalistic when food is scarce. They do not breed in ponds. Spawning takes place during the early rainy season (May-September) in areas of low salinity, muddy bottom and dense growth of mangroves.

#### CULTURE PRACTICES IN THAILAND

The average annual production of sea bass sold at the central market in Bangkok is 200 metric tons. Most of the production come from natural sources (capture fisheries), and a small quantity from shrimp farms. Sea bass culture is similar to other coastal aquaculture systems, for example marine shrimp culture and cultivation of milkfish and mullet which rear naturally when stocked in ponds. Sea bass culture was fairly widespread in Thailand about 30 years ago, mostly in connection with other types of culture and on a very small scale. Many shrimp farmers operate sea bass ponds in the same compound. Some operators of sea bass ponds buy live *Tilapia mossambica*, or raise them in the same pond, to serve as food for this carnivorous fish. Other farmers raise sea bass with trash fish.

The high market demand and successful culture of this species has resulted in an increase in sea bass farms. However, the limited supply of sea bass fry does not enable culturists to undertake large-scale commercial culture.

#### SELECTION OF SITE

The typical features of sea bass ponds resemble those of other coastal fishponds. Therefore selection of a suitable site for sea bass culture is the same as for marine shrimp farming.

Commercial culture of sea bass is usually developed in the coastal provinces especially in mud flats and intertidal area. It is associated with coastal aquaculture systems for shrimps, mullet and milkfish.

#### COLLECTION AND TRANSPORTATION OF FRY

It is necessary for the fish farmers to identify the sea bass fry and collect fry from natural sources as stock for their ponds.

#### Identification of sea bass fry

Fry of 0.5-1.0 cm in length are uniformly dark brown with scattered yellow spots. The bigger fry of 2.0 cm exhibit distinct markings. A brown band runs on the upper part of the body from the end of the mouth to the dorsal fin, the side of the body is yellowish-brown with four to five dark grey stripes. These markings will disappear as the fish grows.



### Natural sources of fry

The fry are abundant in mangrove areas with salinity ranging from 1.0-20.0 ppt. Sea bass spawn in estuarine areas during the early part of the rainy season. The eggs and larvae are carried upstream by the tide into mangrove swamps which serve as nursery grounds.

As previously mentioned, the species is widely distributed along the coasts of the Gulf of Thailand and the Andaman sea. The distribution of fry sources includes the coast of the following provinces:

#### A. Gulf of Thailand

##### (a) East coast

- Chanthaburi
- Rayong
- Chon Buri
- Samut Prakan

##### (b) West coast

- Samut Sakhon
- Samut Songkhram
- Phetchaburi
- Prachuap Khiri Khan

##### (c) Southeast Coast

- Chumphon
- Surat Thani
- Nakhon Si Thammarat

- Songkhla
- Pattani
- Narathiwat

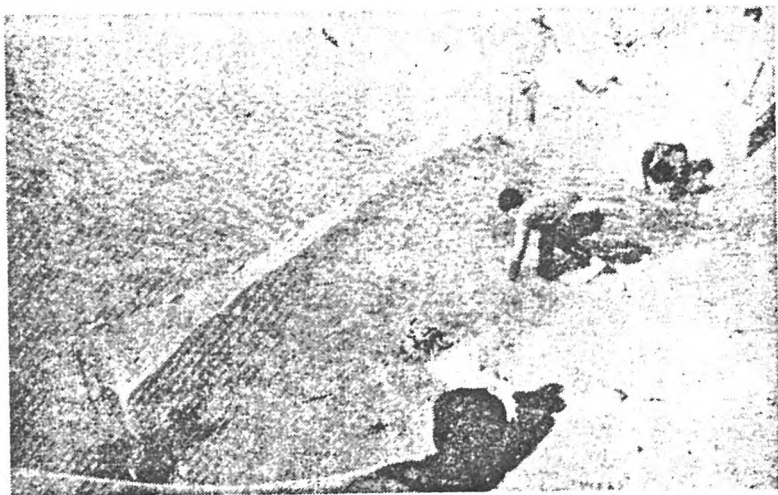
B. Andaman Sea

- Ranong
- Krabi
- Trang
- Satun

Period of fry collecting

Fingerlings ranging from 10-20 cm are found at the beginning of the rainy season from the previous year's fry. The subsequent supply during rainy season consists of mixed sizes but small sizes of 2-5 cm are quite dominant. However, sea bass fry collected from natural sources are usually big enough (size of 10-15 cm) for stocking in grow-out ponds and cages.

Collecting methods



The fry are caught with a seine net of 1 cm mesh by a team of four persons, each holding one of the four wings of the rectangular net measuring of 1 x 5 m. The fry are then graded according to size and put in a container tank. Cannibalism often occurs in fishes of different sizes. Change of water and use of an air pump are necessary. During hot weather, if the water temperature becomes too high, ice may be added to lower the risk of mortality.

In case of large collection of fry, this needs to be carried out in several days prior to transportation. Fry collected each day need to be put in stocking tanks. They can be stocked in sac-like net set in the natural watershed. Large tanks with the capacity of 500-1,000 litres can be used to stock fry. Air compressors or air pumps are required to provide oxygen in these tanks. After collecting a sufficient amount of fry, they will be transported to the ponds.

### Transporting of fry

The practical way of transporting fish is in oxygenated polyethylene bags. These are convenient to carry and the survival rate is high even during a long period of transport of up to 10 hours. The bags used have a total volume of 15 to 20 litres of water. The fry is placed in a bag containing 3 to 4 litres of sea water. After filling the bags with oxygen at low pressure, they are tied with rubber bands. The plastic bag should be packed in a carton box.

The amount of transportable fry depends on the size of fry as shown in the following table:

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Size of fry (cm)	Number of fry per litre of water in the bag
1 - 2	50
3 - 5	25
6 - 8	15
9 - 12	5 - 10
13 - 15	2 - 3

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If transporting is to last more than 20 hours, it is suggested that only small fry in low density be transported in plastic bags. For a short distance or for transport by boat, it is recommended to use container tanks fitted with an air pump. Frequent change of water enables the fry to arrive in perfect condition. This also ensures a high survival rate.

#### NURSING OF YOUNG SEA BASS

Collection of fry may lead to many problems such as the holding tanks and the survival rate. Fry are usually sensitive to environmental changes such as salinity changes and temperature changes. Thus nursing of young sea bass should be closely inspected.

### Nursing in container or concrete tank

Fry sized 1.0 to 2.0 cm should be nursed in an aquarium or container supplied with oxygen. The water depth should be about 30 to 50 cm, and stocking density 300 fry per 50 litres of water. Salinity should be about 10 to 15 ppt. The fry first begin to feed on *Moina* and *Artemia*. After that the fry can be trained to eat *Acetes* and minced trash fish. Fry sized 3 to 5 cm can be obtained within two to three weeks of feeding. If observed at this stage that the stocking density is too high, the fry should be moved from the aquarium or container to a concrete pond.

A concrete pond area of 2 to 3 m<sup>2</sup> with 30 to 50 cm water depth can be used. Salinity should be about 15 to 20 ppt. The stocking density can be 150-200 fry/m<sup>2</sup>. The pond should be shaded and have a drain pipe so that the water can be drained easily at any time. Water should be changed every 2 to 3 days. Organic wastes of dead organisms and left-over food should be siphoned out every day. Chopped trash fish is fed two to three times a day. Owing to the cannibalistic nature of the fish size selection or grading is necessary during the whole nursery period. A screen with various mesh sizes can be used to separate fry of different sizes.

### Nursing in earthen pond

An earthen pond is used for nursing fry bigger than 1 to 2 cm but not big enough for a grow-out pond. Earthen ponds are constructed in coastal mangroves and close to the sea. An average size of pond is about 25 to 50 m<sup>2</sup> and 0.8 to 1.0 m deep with two water gates leading into a tidal canal. The stocking density can be 200-400 fry/pond. The fry are fed with chopped trash fish. The feeding frequency is two to three times a day. The fry should be fed at a fixed site during high tide. The feeding rate is 8 to 10 per cent of total body weight. Feeding rate should be closely observed the first month. Increase the amount of food as fish grow .

### Nursing in nylon net cage

This method is very convenient. The fry can be checked easily. There is no need to change the water. The surface area can be 20 to 25 m<sup>2</sup> and the depth 2.0 m. Knotless netting with a mesh size of 5.0 mm is recommended. The stocking rate is about 300-500 fry per cage. The cage can be fixed with wooden posts in a canal with running water or in a shrimp pond. Feed and feeding of fry in a net cage are similar to nursing fry in the earthen pond.

## CULTURE METHODS

### Culture in shrimp ponds

Stocking time begins after the shrimp have been harvested. An average-sized pond covers about 0.3-20 ha. The size of fry to be stocked is 1-2 cm. The stocking rate is about 10,000 fry/ha or less. No supplementary feed is needed in this method. An abundant food supply depends on the natural food (a mixture of shrimp and young fish) entering the pond. The culture period is four to six months.

### Culture in brackishwater ponds

Ponds are located in the coastal area and within the tidal influences. Both sluice gates are fitted with wire net screens. The size of the rectangular ponds depends on the size of the fish. Salt ponds, abandoned mining sites, small creeks and rivers can also be converted to fish ponds.

### Small culture ponds

The fingerlings sized 10 to 15 cm are stocked in the pond areas of 800 to 1,600 m<sup>2</sup> with 1 m depth. The stocking rate is about 5,000-10,000 fingerlings per hectare. If there is an inefficient system for water circulation installed in the pond, the stocking rate should be reduced to one half. The feeding rate in the pond is practised at 300 gm per 100 fingerlings per day during the period of four to six months.

### Big culture pond

This type of pond is used for raising the bigger fish sized 20 to 30 cm or those transferred from a small culture pond for rearing up to marketable size. The pond size is generally 0.3 ha or more with a 1.0 to 2.0 m in depth. Fish are stocked at a rate of 2,500-5,000 fish/ha. The growing period is 8 to 10 months. The fish are fed an amount of chopped fresh fish of about 1.5 kg/day/100 fish. This type of culture can be applied to freshwater grow-out ponds.

### Culture in net-cage

The cages are usually box-shaped with dimensions ranging from 5 x 5 x 3 m to 10 x 10 x 3 m. The mesh size is 5 to 7 cm. The net cage is tied to wooden poles with a diameter of 15 to 25 cm. Water depth in the cage ranges from 0.7 to 1.5 m depending on the tide. At the lowest tide, however, the water depth in the cage should not be less than 0.5 m. Fish sized 8-10 cm are stocked at a rate of 10 to 15 fish/m<sup>2</sup>.

### TYPE OF FEED

#### Natural food

By opening the water inlet gate to allow water to come in at high tide, a number of young wild fish and shrimp are carried in and serve as food for the young sea bass. This operation is applied for small fish and if the rearing period is short. In some cases, fertilizers are added to increase the pond productivity.



### Live Tilapia

Sea bass is cultured in combination with other species such as tilapia. Sea bass consumes tilapia fry. The tilapia broodstock are introduced two months before sea bass stocking at a density of 2,000 fish/ha with a 1:1 sex ratio. The stocking rate of sea bass sized 10 to 15 cm is 3,000-6000 fish/ha. In some cases tilapia is raised in separate ponds and the fry is collected to be used as food for sea bass.

### Supplementary feed

Fresh trash fish are chopped into pieces small enough to be suitable for the size of the fish's mouth. Feeding rates depend on the size of the fish. The feeding rate of 8 to 10% of the body weight is applied for (the average weight of) fish less than 100 gm and 3 to 5% for fish bigger than 100 gm. The amounts of daily feed given to 100 fish of different sizes are shown in the following table:

---

Average weight of fish (gm)	Feeding rate (%)	Weight of feed(kg) per day for 100 fish
50	8	0.4
100	5	0.5
200		1.0
300		1.5
400		2.0
500		2.5
600	4	2.4
700		2.8
800		3.2

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Average weight of fish (gm)	Feeding rate (%)	Weight of feed(kg) per day for 100 fish
900		3.6
1,000		4.0
1,200	3	3.6
1,300		3.9
1,400		4.2
1,500		4.5

---

Note on feeding

1. Site of feeding

- feeding should always be done at the same place so the fish recognize their feeding place.

2. Feeding method

- feed should be distributed around the culture area and given in small amounts at a time.
- stop feeding when fish stop eating.

3. Feeding frequency

- feeding is done once a day during high tide.
- stop feeding when the water quality changes such as when the salinity changes, there is turbid water, high temperature and plankton blooms. In such cases, the fish will eat less for two or three days.

## POND AND CAGE MANAGEMENT

### Water quality

The water in the pond has to be partially changed each day by opening the water inlet gate to allow water at high tide to enter the upper part of the pond. When the tide recedes, the water outlet gate is opened to drain water from the bottom. This is to maintain the good water quality. It helps to avoid fish diseases and the accumulation of organic wastes.

### Dike checking

The dikes are carefully checked for leaks and other damaged parts by burrowing animals. Damage, especially by crabs in brackishwater ponds, can be troublesome and can cause leaks. The dike must be repaired immediately in this case to prevent the fish escaping from the culture pond.

### Water current

In the case of net-cage culture, care must be taken that there is sufficient flow of water through the cage and interference of strong wind and waves must be avoided.

### Predators and pests

Frequent inspection for predators and pests is required. Among these are water fowl, water snakes, crabs and bigger fish.

### Causes of Mortality

Diseases and other causes of mortality are not a great problem at the grow-out stage. Frequent capture and scaring the fish can cause them physical damage.

Crustaceans have long been known to be parasites of fish, especially important among them are copepod and isopod. They usually attach themselves to the gills. This causes emaciation and loss of condition. Removing the parasites can be done with tweezers or a soft brush.

### YIELD

The yield in a grow-out pond stocked with fish weighing each 50 to 100 gm is about 2,500 kg/ha. The growing period is six months. The survival rate is about 60%.

The yield in cages stocked with fish weighing each 100 to 200 gm is 3 to 5 kg/m<sup>2</sup>. The growing period is 12 months. The survival rate is about 90% and the feed conversion ratio ranges from 7 to 10.

### CAGE CULTURE OF SEA BASS

Sea bass *Lates calcarifer* is one of the most popular fish in Thailand. It is normally found in brackishwater but can also be found in rivers and canals. When this fish occurs in freshwater, it is called "freshwater sea bass". Sea bass has a long, dorsoventral body; large mouth with tiny sharp teeth, the lower jaw longer than the upper jaw; and the rim of the operculum is serrated. The dorsal part of the body is bluish-green and the ventral part, especially the belly, is silver. The tail has two colours: yellow and black.

Cage culture of Sea bass is suitable in shallow-water areas of a river, canal, swamp, lake or seashore. The cost of cage culture in such areas is found to be very low and normally there is no disease problem.

Sea bass is a very strong fish and has an ability to adjust itself to live in both fresh and salt water. It fetches a high price, from 30 to 50 a kilogramm. Sea bass culture can be a good source of income.

### FRY COLLECTION

Fry can be collected in the shallow waters along the coast. However, they are also found in rivers, canals and swamps or even in rice fields where there is a connection with the sea. Fry season in the Gulf of Thailand is between October to January, while in the Indian Ocean it is May to August.

Sea bass fry can be identified by the light brown stripe on the dorsal part of the body. This stripe runs from the mouth to the base of the first dorsal fin. Fry less than 3 cm are light brown with cross black stripe. Very young fry are black.

Fry can be collected with a trawl net of a 5 mm mesh, 2 to 3 meters in length and 1.5 meters in depth. Fry collected in this way measure 1 to 15 cm. Those collected in the early season are only 6 cm in length.

Sea bass fry can be purchased from the Department of Fisheries, Bangkok, Thailand, and from private dealers in Rayong and Bangsen.

## NURSING

### 1. Nursery Ponds

Ponds suitable for nursing fry should be made of cement. They should be triangular in shape, with an area of 3 to 5 m<sup>2</sup> and a depth of 50 cm. Such ponds can contain 300 to 500 fry of 3 cm in length. Earthen ponds can be used if cement ponds are not available.

### 2. Water quality

The water used for nursing should be rid of impurities and have the same salinity as the area from which the fry were collected. Fry should not be nursed in freshwater. If necessary, 1 tablespoon of salt should be added to 1 litre of water (salinity 10-12 ppt.) There must be constant water aeration and circulation.

### 3. Food

Moina and tiny shrimp are used as food for fry 1.5 cm in length. For fry over 1.5 cm, chopped fish meat is used. They should be fed three times a day, but they should not be overfed since this may cause the water quality to deteriorate.

### 4. Mortality

Since Sea bass fry are carnivorous, they must be graded frequently. Fry should be nursed to the size of 10 cm or more before they are transferred to a cage.

## CAGE CULTURE

### 1. Site selection

Criteria for selecting suitable sites for cages are as follows:

The water depth should not be less than 1 m, and there should be a water current.

A shelter is needed to protect the cage from the wind.

The cage should be set in an area far from polluted water.

## 2. Materials

Nylon cage, 5 x 5 x 2.5 m<sup>3</sup> (W x L x D) using nylon number 5 with mesh size 20-25 cm. A cage of this size costs  $\text{฿} 1,600$  and will last 3 to 4 years. It can stock 300 fish.

## 3. Feeding

Trash fish is used for feed. It cost  $\text{฿}1.5/\text{kg}$  in 1978. The fish must be chopped in small pieces or ground before being given as feed.

The appropriate size for stocking in cages is 10 cm. The fish should be fed during high tide gradually until they stop eating. They should not be overfed. Food left on the bottom of the cage may attract other aquatic animals.

## 4. Production rate

The results obtained from Songkhla Station show that, within one year, the production is 300-500 kg/100 m<sup>2</sup>. Survival rate is 90%. The food conversion rate is 1:7-10.



LIST OF SAFIS EXTENSION MANUALS

- SEC/SM/1 Khumua liang pla namcheut (Freshwater Fish Farming: How to Begin)-- in Thai
- SEC/SM/2 Oyster Culture
- SEC/SM/3 Mussel Culture
- SEC/SM/4 Ang pagpuna ug pagtapak sa pukot (Net Mending and Patching)-- in Cebuano-Bisaya
- SEC/SM/5 Mussel Farming
- SEC/SM/6 Menternak Ikan Airtawar (Freshwater Fish Farming: How to Begin)-- in Bahasa Malaysia
- SEC/SM/7 Makanan dan Pemakanan Udang Harimau, *Penaeus monodon* (Nutrition and Feeding of Sugpo, *Penaeus monodon*) -- in Bahasa Malaysia
- SEC/SM/8 Macrobrachium Culture
- SEC/SM/9 Selection of Marine Shrimp for Culture
- SEC/SM/10 Induced Breeding of Thai Silver Carp
- SEC/SM/11 Culture of Sea Bass

## SAFIS

0 What is SAFIS?

SAFIS is the Southeast Asian Fisheries Information Service. It is a project of the SEAFDEC Secretariat set up to provide extension materials for small-scale fishermen and fish farmers in the region.

0 What are its objectives?

The immediate objectives are to collect and compile fisheries extension manuals, brochures, pamphlets and related aids for small-scale fisheries development, and to translate selected literature into local languages for distribution to fisheries extension workers in Southeast Asia.

0 What services will SAFIS provide?

SAFIS will attempt to provide information and publications such as:

- lists of available texts in fisheries extension services,
- translation of suitable manuals,
- manuals of appropriate technologies,
- photocopies of appropriate fisheries extension literature,
- a current awareness service of regional fisheries.

0 How much will these services cost?

A nominal cost of US \$0.15 per page will be charged for photocopying, handling, and surface mail. Airmail costs will be extra. The publication cost per manual will vary according to the book.

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SAFIS is the Southeast Asian Fisheries Information Service. It is a project of the SEAFDEC Secretariat set up to provide extension materials for small - scale fishermen and fish farmers in the region. For additional information, contact the Project Leader of SAFIS

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