

Fish Production and Marketing in the Mediterranean Coastal Lagoons

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Jel Classification: Q 130, Q 160

1. Introduction

Coastal lagoons cover 15% of the total world coastal zones. The most productive coastal lagoons are located along the Mediterranean coasts. There are several coastal lagoons, in particular in Italy, Morocco, Turkey, Greece, Spain, France, Algeria and Egypt (Ravagnan, 1978). Production reaches a maximum of 300 kg/ha, with an average of 56 kg/ha (STM, 1997). Fish production from Italian lagoons comes to 100 kg/ha, which represents 38% of the total fish production (STM, 1997).

There are 47 saline lagoons located along the Turkish coasts and 23% of them are located in the Mediterranean region (Figure 1). Some recent studies showed that there are only 6 lagoons in the Mediterranean region which are still economically productive (Figure 2) (Emiroglu et al., 2002).

The total surface area of Turkish lagoons equals 35710 ha. Mediterranean lagoons cover 33% of the whole surface area. Mediterranean lagoons yield 40% of the total fish production of coastal lagoons. The total fish production in Mediterranean lagoons was estimated at 389.2 tons. On an average, production is about 23,2 kg/ha, but it may go down to 10 kg/ha in some unproductive lagoons (Emiroglu et al., 2001)

In view of assessing the production, processing and marketing activities of Turkish coastal lagoons in the

Abstract

There are 47 saline lagoons located in whole Turkish coasts and 23% of them are located in the Mediterranean Region. The recent studies showed that only 6 lagoons are left in Mediterranean Region, which are productive. Mediterranean lagoons produce 40% of total fish production of coastal lagoons. Mullet species (*Mogul* sp., *Liza* sp.) are being captured in all lagoons. Beside these species, juvenile sea bream (*Sparus aurata*), eel (*Anguilla anguilla*) and crab (*Callinectes sapidus*) are being captured from Mediterranean Lagoons. The distribution channel has to be improved in order to satisfy the lagoon management as financing aspects and to improve the production. Also some kinds of improvement studies like valliculture, deepening, and seafood-processing units are advised.

Résumé

*Le long des côtes de la Turquie il y a au total 47 lagunes salées, dont 23% situées en région méditerranéenne. Des études récentes ont montré qu'il reste 6 lagunes en région méditerranéenne. Les lagunes méditerranéennes produisent 40% de la production totale de poisson des lagunes côtières. Des espèces de mullet (*Mugil* sp., *Liza* sp.) sont présentes dans toutes les lagunes. En plus de ces espèces, les dorades juvéniles (*Sparus aurata*), les anguilles (*Anguilla anguilla*) et les crabes (*Callinectes sapidus*) sont capturées dans les lagunes méditerranéennes. Ce canal de distribution doit être amélioré pour satisfaire la gestion de lagunes sous les aspects financiers et pour améliorer la production. On recommande également des études d'amélioration telles que la valliculture, l'intensification, la transformation des fruits de mer.*

Mediterranean region, some technical investigations and surveys were carried out.

2. Material and methods

The original data was collected from field research in the Mediterranean coastal lagoons. Furthermore, records and reports of institutions involved, local and foreign literature were used to support this study. The research focused on coastal lagoons in the Mediterranean region. The population was determined based on records from the Ministry of Agriculture and from Fisheries Faculties in relevant locations.

According to official records, there are 17 coastal lagoons (TOK, 1987). A full counting method was used in order to get more accurate data. All 17 lagoons were visited and 6 of them were found to be productive. Surveys were based on interviews with the lagoon managers and workers. SPSS 9.05 software was used for statistical data analysis¹.

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3. Results

Mediterranean lagoons are located in particular between Fethiye and the delta of Seyhan - Ceyhan Rivers. There are 6 productive lagoons in the Mediterranean region stretching over a total surface area of 1587 ha. The total fish production was estimated at 389.2 tons. The surface area of Agyatan (Adana) lagoon covers 76% of the total surface area of the Mediterranean lagoons. The amount of caught fish in Akyatan (Adana) and Paradeniz (İçel) lagoons represents 64 % of the total catches from Mediterranean lagoons.

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Figure 1. The regional distribution of coastal lagoons in Turkey (Emiroglu et al., 2001)

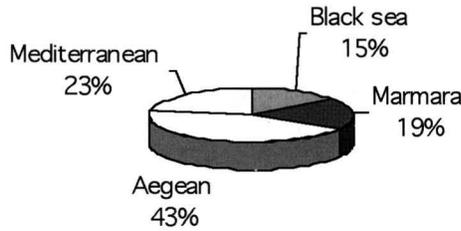
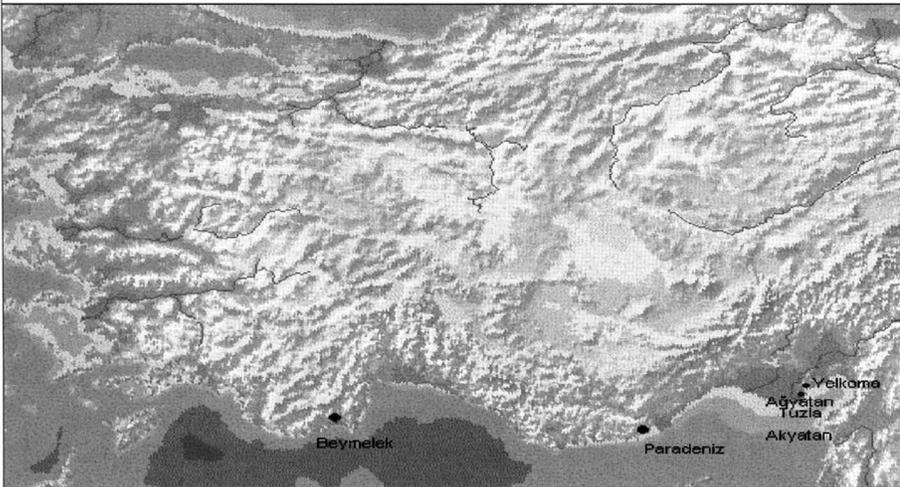
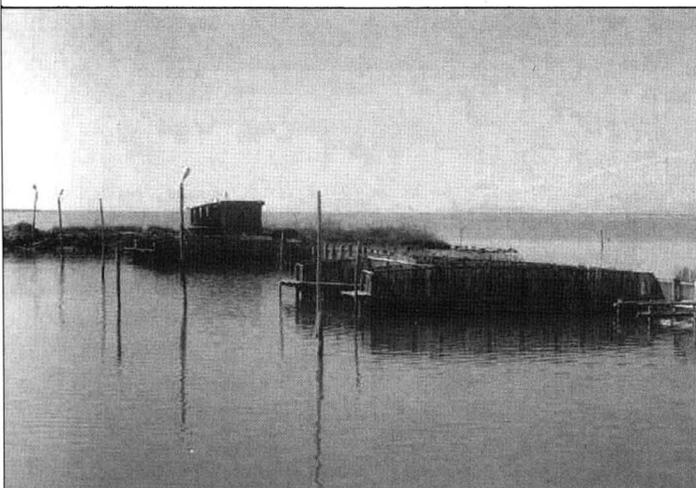


Figure 2. Coastal lagoons in the Mediterranean region of Turkey



The fishing methods applied in the lagoons are the following: traps, nets, long-line, seine net and fyke-net. Traps are usually removed before and after the production period in order to enable fish to migrate into and out of lagoons. The average trap set amount is 5 per lagoon. The maximum trap set found was 12 in Akyatan lagoon. The minimum trap set was only one in Beymelek lagoon. All trap sets are made of pike material. However, there

Figure 3. Trap sets installed in the Mediterranean lagoons



were also concrete trap sets in Beymelek lagoon, but they could not be used due to project and construction failures. Traps are usually removed in January - February and placed again in June. Traps in Beymelek lagoon are usually removed in September and placed again in April because it gets warm earlier and furthermore, the lagoon is used as water and fingerling source for the hatchery built nearby. In the lagoons surveyed capture by traps generally lasts 5 to 6 months (Figure 3) (Table 1).

The average production per lagoon amounts to 64.87 tons per year. Mullet species (*Mugil sp.*, *Liza sp.*) are captured in all lagoons. Aside from these species, juvenile sea bream (*Sparus aurata*), eel (*Anguila anguila*) and crab (*Callinectes sapidus*) are captured from Mediterranean lagoons. (Table 2).

Aquaculture production is observed only in Beymelek (Antalya) lagoon. The sea bream and sea bass egg production hatchery in Beymelek lagoon produces larvae for fish farms located along the Aegean and the Mediterranean coasts. There are earthen ponds that are designed for wintering the captured fish in Paradeniz, Agyatan, Tuzla and Yelkoma lagoons. However, they are not managed efficiently. The captured fish in lagoons are marketed by lagoon cooperatives or brokers. The lagoon products are usually sold in local markets and some of them are sent to metropolis such as Adana, Antalya, Ankara, Izmir and Istanbul. Locally-consumed fish species are mullets, sea bream (juvenile) and sea bass.

All captured fish are transported as fresh in plastic and wooden packages by cooler-equipped vehicles. 17% of the Mediterranean lagoons export blue crab to European markets through export companies. Beymelek, Paradeniz and Agyatan lagoons market their products in their own shops or near big cities (Table 3).

Beymelek lagoon specializes in production of larvae to supply the fish farms located along the Aegean coast.

Table.1. Technical status of the lagoons

Lagoon	Channel Number	Trap set Material	Number of trap sets	Trap set Removal Date	Trap set Placement Date
Beymelek	1	Pike	2	September	April
Paradeniz	1	Pike	6	February	June
A_yatan	1	Pike	3	February	June
Akyatan	1	Pike	12	February	June
Yelkoma	2	Pike	8	February	June
Tuzla	1	Pike	3	February	June

Table 2. Production in the Mediterranean lagoons

Lagoon	Captured species	Fishing Method	Total production (tn)
Beymelek	Mullet, Sea bream, Eel, Sea bass	Nets, Trap, Fyke-net	286
A_yatan	Mullet, Sea bream, Eel, Sea bass, Crab	Trap, Nets	286
Tuzla	Mullet, Sea bream, Eel, Sea bass, Crab, Sea bream (juvenile)	Trap, Nets	32
Yelkoma	Mullet, Sea bream, Crab, Sea bream (juvenile)	Trap, Nets	50
Paradeniz	Mullet, Sea bream, Sea bass, Crab, Sea bream (juvenile)	Trap, Nets	107
Akyatan	Mullet, Sea bream, Sea bass, Crab, Sea bream (juvenile)	Trap, Nets	143

Table 3. Marketing of captured fish in the Mediterranean lagoons

Lagoon	Market	Distribution	Marketed as
Beymelek	Beymelek	Owner	Fresh
Paradeniz	Silifke, Mersin, Izmir, Ankara, Istanbul	Owner	Fresh
Tuzla	Adana	Cooperative	Fresh
Akyatan	Adana Karatai	Cooperative	Fresh
A_yatan	Adana, Istanbul, Europe	Owner (Fish Wholesale Market, export companies)	Fresh, frozen
Yelkoma	Adana	Wholesale market	Fresh

4. Discussion

In all the surveyed lagoons, there are only mono-direction trap systems which catch the leaving fish from lagoons. This system does not allow catching the fish which migrate into the lagoon for feeding and causes a decrease in fishing efficiency. However, trap material is an important factor affecting directly fishing efficiency and lagoon expenses (Ardizzone, 1988). The pike set is usually damaged by extreme sea conditions and fish escape from the lagoon to reach the sea. On top of that, the pike set openings may be plugged by algae or other pollutants and consequently, the water flow between the sea and the lagoon may decrease gradually. This minimal water flow generally affects the natural fish migration between the lagoon and the sea. Since it is necessary to renew the pikes every year, more material and labor costs are generated in the Mediterranean lagoons. Modern trap systems made of concrete columns and anti-corro-

sion or plastic-covered metal sets display considerable advantages such as bi-directional installation and lower labor requirements for installation. There is an urgent need for investments in modern trap systems in all lagoons to optimize the fishing efficiency (Ardizzone, 1988).

The fish population in the sea near the lagoon is a determining factor for the fish stock inside the lagoon. As the amount of fish inside the lagoon mainly depends on the migration of fish from the sea to the lagoon, extreme coastal fishing would decrease or destroy fish stocks. These effects might gradually cause a decrease in the total number of fish migrating into the lagoon and the lagoon productivity. Strictly controlling extreme fishing activities in coastal zones would be beneficial for preserving and managing fish stocks in lagoons.

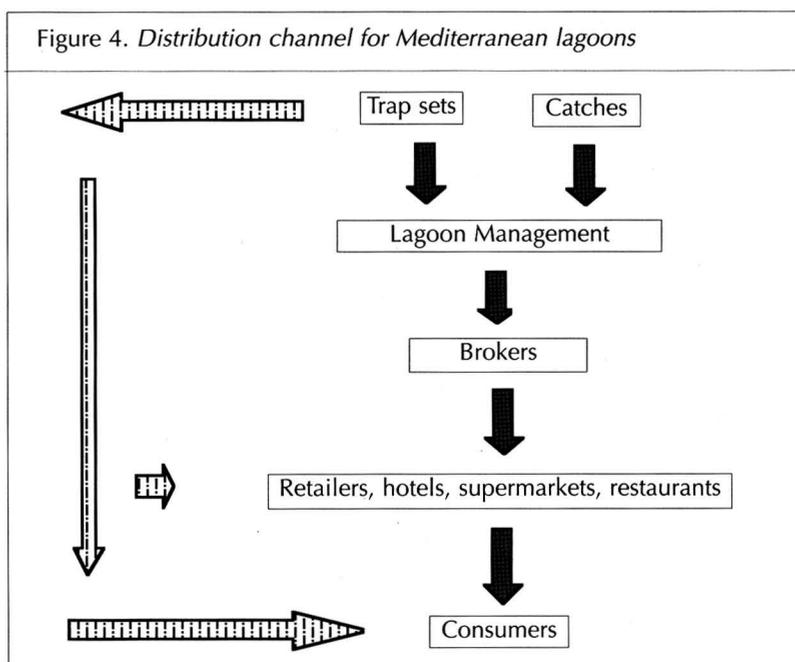
Lagoons are well-chosen places for intensive, semi-intensive and extensive fish production at low cost for water exchange, feed, production areas and high-stock availability (Tolon, 1998). Lagoons are huge aquaculture ponds that offer optimum conditions especially for hatchery construction. There is a private hatchery in Yelkoma lagoon and a state hatchery in Beymelek lagoon that belongs to the Ministry of Agriculture.

The valliculture system which is widely used in Mediterranean countries would increase the productivity of lagoons (Lumare, 1982). In the valliculture system the remaining fish inside the lagoon are collected and placed into valli ponds and channels in the winter time in order to save the fish from extreme cold weather and water conditions.

The problems encountered for valliculture installation in the Mediterranean lagoons of Turkey are the lack of technical information, planning and digging machines and equipment to maintain the channel depth at the required level during the winter time in the lagoon area. The appropriate models for valliculture should be adapted to local conditions with a view to increasing the production rate.

Brokers generally pay an early deposit to the

Figure 4. Distribution channel for Mediterranean lagoons



lagoon cooperatives for their catch. This early deposit enables the brokers to buy the catch cheaper than the market wholesale price. Lagoon managers usually need cash during the preparation period before production. They get cash from commissioners and pay this credit by their catch at low prices.

Some lagoon cooperatives are planning to market their fish through their retail stands or restaurants, but due to the difficulties of reaching lagoon locations these projects demand considerable investments. Retail stands are present in 4 lagoons (Karina, Bafa (Sakızburnu), Bogaziçi (Tuzla), Köycegiz) in the Mediterranean region. These lagoons market 70% of their production in their own retail stands. The distribution system for all lagoons should be improved and optimized in order to maximize the profit rate (Figure 4). The government support to local and foreign investors should be increased in order to achieve this aim.

Some problems occur in the marketing of Blue crab, whose domestic demand is insignificant although the high amount caught from the Mediterranean lagoons. Blue crab is usually marketed to foreign markets. Lagoon cooperatives cannot export these products directly to foreign countries and therefore, they sell their products through export companies. At the same time, lagoons need additional ponds to keep crabs in order to purify them before exporting. There are no such ponds in lagoons that are harvesting crab. Export companies process these products, and accordingly, the profit rate is usually low for the lagoon cooperatives. The construction of these additional ponds and processing units would maximize the lagoon income allowing to sell crabs as a value-added product.

5. Conclusion

Long-term lagoon improvement activities require heavy investments. Lagoons generally belong to the government

and the renters can not pay the required amount of cash for rehabilitation. Thus, the government, the local and foreign investors who seek for a profitable investment should take all rehabilitation actions through a joint venture. Moreover, as lagoons have a reputation for their low-cost intensive production, the professional companies with special expertise in pond aquaculture might invest in such profitable production projects in order to get a high revenue.

Integrated improvement projects have vital importance to eliminate technical, social and economic problems in the lagoons. Thus, a unique institution, responsible for lagoons and improvement-based management model, would mainly increase the production of lagoons.

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