



Harvested scallops, *Argopecten purpuratus*.

Early Setback for Scallop Culture in Peru

MATTHIAS WOLFF¹

Institut für Meereskunde
Düsternbrooker Weg 20
2300 Kiel, West Germany

The fishing area of Pisco lies about 250 km south of Lima (between 14°20'S and 13°35'S) and is influenced by the nearby upwelling center of San Juan. For decades, it has been the most important area for Peruvian invertebrate fisheries, in particular for the scallops and mussels. Its long coastline (≈ 90 km) has many sandy bays and guano islands, which, with their guano birds, sea lions and penguins, attract many tourists. Everyday in the early afternoon a southerly wind ("Paracas") starts to blow and along with the tidal cycle, provides for a constant water exchange; fresh upwelling water rich in nutrients, oxygen and plankton, is carried deep into the bays. For the invertebrates, critical life conditions very seldom arise and only in the summer months due to a cessation of the "Paracas" wind. At this time, the water is warmed up quickly by the strong solar radiation, and red tides and/or lack of oxygen can occur.

The Scallop Fishery

The scallops, like all the other invertebrates of the area, are fished by divers using compressors. They are put into

large sacks of fishing net material, which are sewed when filled. In the harbors, the sacks are then loaded onto trucks that transport them to the fishing market of Lima within the same night.

The high market value and the easy attainment of the scallop, found on sandy banks between 7 and 20 m water depth, has led to a steady increase in fishing pressure during the past years. As a result, predominantly small individuals less than a year old are caught; the minimum landing size of 55 mm is often not heeded. The fishery has developed into a "pulse-fishery", exclusively depending on the strength of the newly recruited year class. After an initial increase in the catches, there is a sharp decrease leading to an almost complete depletion of the stock at the end of the fishing season.

Shells of 120-140 mm height found on remote beaches and information from fishermen indicate that larger stocks used to exist.

First Step to Scallop Cultivation

At the end of the 1970s, the first fisherman and his family began to fatten scallops in the shallow water of the Bay

of Paracas. They succeeded, and since September 1982 more and more entrepreneurs have joined this business expecting it to be a lucrative source of income.

The first step in scallop cultivation is to obtain seed scallops, preferably of 30-40 mm shell height; these are fished by divers on the natural banks and later transferred to the shallow water of the bay, where they are scattered on the bottom and allowed to grow naturally. Because the scallops migrate occasionally, the culturing areas have to be fenced in with fishing nets weighted with heavy stones with floats on their upper edges. The average size of a scallop farm is 1-2 ha; water depth is about 2-4 m. Stocking densities of 60-100/m² have proven to be economical.

Culturists report that heavy losses due to predators do not occur—so predator control is not employed. Mortalities caused by transportation of juvenile seed scallops are reported to be about 15-25% which is economically feasible.

¹Current working address: Universidad Nacional San Luis Gonzaga de Ica/Demetrio Miranda 249, Pisco-Playa/Peru.

When the scallops have grown to a size of 75-80 mm, they are collected by divers, put into sacks and sold. Yield produced per growing season (6-8 months) is in the order of 3-5 t of meat/ha. The price of these large-sized scallops is much higher than that of the smaller ones caught on the natural banks making this business worthwhile.

El Niño 1983—Fortune for Scallop Fishers and Bad Luck for the Culturists

Since the beginning of spring 1982 (September-October), an abnormal increase in the water temperature was registered in the area of Pisco. In January 1983, the temperatures in the shallow bays reached 28/29°C—6-8°C higher than normal years. As a consequence, many fish and invertebrate species, adapted to fairly cold upwelling water, died or emigrated (compare ICLARM Newsletter, July 1983, p. 5-7). Surprisingly, this did not happen with the scallops: in fact, just the contrary. Divers reported a mass occurrence of juvenile scallops on the natural banks in February 1983. Densities of 100-150/m² were found. Personal



Market-size scallops.

diving observations on the banks confirmed these reports.

The catch per unit of effort, as well as the average landing size, increased remarkably during the following months. Fishing boats from other parts of the Peruvian coast came to join the scallop boom. In August 1983, the total landings exceeded 60 times that of August 1982. During this month, exportation of the scallop to the U.S.A. was initiated (20 t muscle flesh daily).

Obviously, the high water temperatures led to an enormous increase in reproductive activity and/or excellent survival rate of scallop larvae and postlarvae. It must be concluded that *Argopecten purpuratus* is not only tolerant to these high water temperatures, but even favored by them. It is interesting to note that this scallop is usually considered more of a cold-water species, its main distribution being along the southern Peruvian and northern Chilean coasts down to Valparaiso where the average water temperatures are even less (12.5-15°C). However, some small scallop banks are known to exist in northern Peru up to Paita, but these are of little importance to the fishery.

Whereas this *El niño* favored and still favors the many people involved in the scallop fishery export business, such as the divers and co-workers, middlemen, scallop cleaners and packers, exporters and consumers, the only ones that were adversely affected were the owners of the bottom cultures. The price of the scallops fell so drastically that selling even the large cultured individuals was

not economical. Since the first week of November, however, the catches have decreased, as well as the average landing size of the scallops. The price and demand for larger individuals are slowly increasing again.

Future Outlook

A new management of the scallop fishery is urgently needed. Based on a population study in 1980/81, it is recommended that the minimum landing size of 55 mm be raised to (at least) 70 mm. This should result in an increase of stock biomass and reproduction potential leading to an increase of the yield after a preliminary period of lower catches.

The next step in scallop cultivation should be larval collection enabling the culturist to become independent of juvenile scallops from the natural banks.* Once this is achieved, the spat should be transferred to intermediate rearing facilities above the sea bottom before the scallop is finally scattered on the bottom. Primarily important for future development is, however, detailed biological knowledge such as spawning time and causing factors, suitable substrate for larval attachment, larval development, etc. So, much investigation has yet to be done.

*A mollusc hatchery, which will include production of Peruvian scallops, is under way in Mexico (see p. 21).



Scallop diver about to descend.