Scallop in seagrass garden

Solitary seagrass meadow in Chile supports a unique scallop garden

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A POSTGRADUATE COURSE WAS FOR MANY OF US THE FIRST OPPORTUNITY TO VISIT A SPECIAL PLACE THAT WE HAD HEARD ABOUT ON MANY OCCASIONS DURING OUR TENURE AT UNIVERSIDAD CATÓLICA DEL NORTE IN COQUIMBO, CHILE. THE DIRT ROAD LEADING TO PUERTO ALDEA AND THE LACK OF PUBLIC TRANSPORT DETERS THE AVERAGE VISITOR, EVEN THOUGH IT IS ONLY 50 KM AWAY FROM OUR UNIVERSITY. NEVERTHELESS, IT IS WORTH THE EFFORT TO MAKE A VISIT TO PUERTO ALDEA, A SMALL FISHING COMMUNITY THAT DEPENDS PRIMARILY ON SCALLOPS. IN CONTRAST TO MANY OTHER BAYS WHERE SCALLOP OCCUR SCATTERED ON BARE SOFT-BOTTOMS, THE SCALLOPS FROM PUERTO ALDEA ARE LIVING IN A NATURAL GARDEN, A SEAGRASS MEADOW.

Seagrasses are found in shallow waters in protected bays and estuaries throughout the world. The 60 described species of these flowering plants (Angiosperms) are completely adapted to the marine environments. The species that forms the seagrass meadow from Puerto Aldea, *Heterozostera tasmanica*, is one of them. This species is native to the southern coast of Australia, where it forms extensive meadows. The only other place outside of Australia from where *H. tasmanica* has been reported is in northern Chile (Figure. 1). How did this species reach this distant place? The wide extension of the meadow in Puerto Aldea suggests that *H. tasmanica* has probably colonized the Chilean coast a long time ago. The fact that another smaller meadow has been reported about 400 km north of Puerto Aldea is even more puzzling because, so far, no flowering plants of *H. tasmanica* have been found in Chile. Consequently, one must assume that propagation is primarily vegetative. During the past few years, rumors about other isolated patches have increased, suggesting that *H. tasmanica* may be successfully dispersing and expanding its range along the northern Chilean coast.

While the dispersal mechanism and population dynamics of *H. tasmanica* in Chile is of great interest to the marine scientist, the fishermen of Puerto Aldea are more interested in the ecological interactions developing under the seagrass canopy because this meadow shelters their principal resource: the scallop. Since a few years the fishermen from Puerto Aldea care for this natural garden of scallops, under the concept of participative management. They have associated themselves and they monitor 'their' scallop stock regularly, and they only exploit when scallops are sufficient in number and size. The close association between the seagrass meadow and the scallops facilitates this gardening. Becoming aware of the importance of the seagrass meadow has awakened the interest among fishermen to learn more about the ecological relationship between the seagrass and 'their' scallops.

Functions and Biodiversity of the Seagrass Meadow

Seagrass meadows provide a habitat due to their structural complexity and stabilizing properties. They supply refuge and food for many organisms that live among the seagrass matrix, both plants and animals. This is immediately visible to the fishermen of Puerto Aldea who encounter large abundances of invertebrates and fishes in 'their' seagrass meadow. Scallops (*Argopecten purpuratus*) and commercially exploited crabs (*Cancer setosus*) are among the most common large organisms found in the seagrass meadow of Puerto Aldea. When opening the dense cover of the seagrass canopy other creatures come into sight, clumsy juveniles of crabs try to crawl away, dense aggregations of shrimp dart into all directions, and several species of colourful sea anemones catch the attention of the interested diver. Further down, among the seagrass rhizomes, tube-dwelling polychaetes and filter-feeding sponges abound. Dense schools of juvenile fish hover above the seagrass meadow, occasionally descending down between the shoots to prey on the abundant fauna living in the meadow. To date, 117 different organisms have been reported from the seagrass meadow

Figure 2. The seastar (Meyenaster gelatinosus), one of the important predators of scallops in the seagrass meadow of Puerto Aldea.

of Puerto Aldea (Gonzalez, 1990), but most likely the diversity is even higher, because there are some species that could not yet be identified.

The fishermen from Puerto Aldea have recognized one of the principal ecological features of 'their' seagrass meadow – it serves as an ideal nursery ground for the species, which they exploit commercially. They easily see the large numbers of juvenile crabs and scallops, and follow their development day by day. The dense aggregations of scallops also show them that their seagrass meadow is a very productive place, and they perceive that the seagrass provides abundant detritus to trophic webs. Being out in their seagrass meadow year-round they also notice that many predators are attracted to the seagrass bed – fishes, crabs and seastars. The fishermen have identified the principal enemy: the voracious seastar *Meyenaster gelatinosus* (Figure. 2). They see the seastars preying on their scallops. Perceiving the threat that seastars pose to their resource, the fishermen have, on several occasions, attempted to take control by actively removing seastars from the seagrass meadow. Since the local scallop garden is a well defined area in a dense seagrass meadow this approach appears feasible and fishermen have gone one step further to becoming the active care-takers of their herd of scallops. However, while it is true that seastars prey on scallops, their prey spectrum is not limited to these tasty bivalves. Seastars also feed on a wide variety of other organisms present in the seagrass. Among these additional prey species thrive several species of herbivorous snails. Thus, removal of seastars might release predation pressure on these grazers, thereby indirectly affecting the seagrass itself. Abundant populations of snails might lead to a reduction of seagrass cover and thereby a deterioration of the living conditions for the scallops. The fishermen are collaborating with ecologists from local universities in order to learn more about the delicate ecological balances in their seagrass meadow. They know that good care-taking requires a good understanding of the ecological interactions.

This example demonstrates that humans are

keystone members of the seagrass community in Puerto Aldea. Enormous shells heaps from pre-Columbian times provide testimony that the area has been a rich fishing ground for centuries before the arrival of the colonists (Figure. 3). The persistence of the seagrass beds and its associated fauna until now suggests that human activities have not yet interfered with this unique ecosystem. New technological advances could change this scenario, however.

Future for the unique seagrass meadow of Puerto Aldea

Urban development and aquaculture activities are intensified in the vicinity of Puerto Aldea. Improved infrastructure and the arrival of running water might bring increasing numbers of tourists. These increasing external pressures might affect the integrity of the seagrass meadow in the future. The local fishermen are aware of the importance of the seagrass meadow and they have taken care of it well in the past. They have repeatedly expressed both in word and action their interest in maintaining this unique place. It is to hope that they will be able to increase their own living standard (e.g. by having running water in their homes) while at the same time conserving their natural scallop garden.

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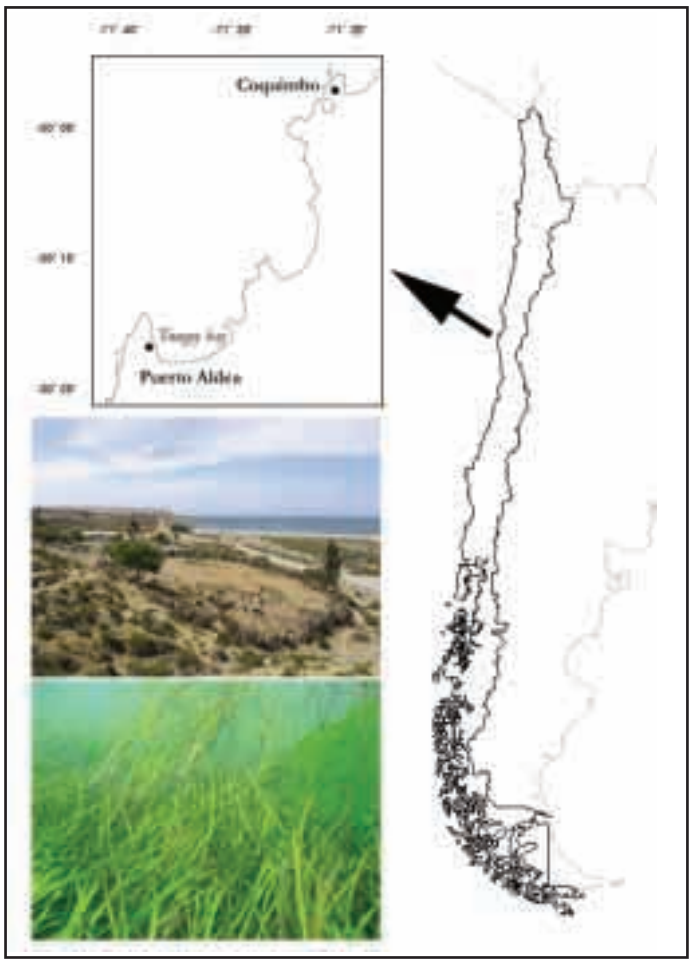

Figure 1. The seagrass meadow and Puerto Aldea 50 Km south of Coquimbo, Chile.

Figure 3. Shell heaps from pre-Colombian times in the vicinity of Puerto Aldea.