

CATCH SHARES IN ACTION

Spanish Galicia Goose Barnacle Cofradía System



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The Spanish Galicia Goose Barnacle Cofradía System was implemented to manage the highly lucrative goose barnacle fishery. Program goals were focused on reducing overfishing and restoring profitability. The program codified traditional fishing guilds, known as *cofradías*, as co-managers by granting them secure and exclusive privileges to harvest goose barnacles within clearly defined fishing areas and requiring them to responsibly manage the resource. A key program innovation is the use of on-site fisheries ecologists to conduct scientific monitoring, set appropriate mortality controls and adaptively manage mortality controls within season to ensure sustainable goose barnacle populations.

In 1992, the Galician fisheries ministry (Consellería do Medio Rural e do Mar) developed a catch share program to increase accountability and improve management in the goose barnacle (*Pollicipes pollicipes*) fishery. The fishery occurs in coastal waters that fall under the jurisdiction of the Galician regional government (Freire and Garcia-Allut, 2000). Recognizing the management potential of existing social institutions, the Galician fisheries ministry granted exclusive harvesting privileges—also known as Territorial Use Rights for Fishing (TURFs)—to traditional fishing guilds, or *cofradías*. Each *cofradía* is accountable for developing an annual management plan and implementing appropriate controls on fishing mortality within its TURF area. With funding from the Galician fishing ministry, each *cofradía* enlists an on-site fisheries ecologist to assist with biological monitoring and improve the science available for setting appropriate controls on fishing mortality.

Galicia is home to an estimated 16,000 artisanal fishermen (Macho et al., 2008) and leads Spain in total fisheries landings, with an average catch of 196,000 metric tons per year valued at EUR €442 million (Macho et al., 2010). As a culinary delicacy, goose barnacle has become one of the most lucrative species harvested. The species grows in dense aggregations on intertidal and subtidal rocks. Fishermen access barnacle aggregations either on foot or by boat and typically harvest them by using a scraping device to remove the barnacles from the rocks (Pérez, 1996).

SYNOPSIS

Road to a Catch Share

Spain has a long history of cooperative fisheries management. As early as the 12th century, kings granted special harvesting privileges to fishing guilds known as *cofradías* (Franquesa, 2004), and these social institutions have endured and adapted to centuries of political and economic transformation. The activities of modern *cofradías* typically involve coordination of harvesting and marketing activities over traditional fishing areas.

In the 1970s, the Galician government legally recognized the fishing grounds of Galician *cofradías* (J. Molares, personal communication, 2013). However, without management support or the ability to exclude outsiders, *cofradías* struggled to manage their areas effectively. As tourism began to flourish in Spain during the 1970s, harvests of goose barnacles increased rapidly (Macho et al., 2008). The lack of scientific information on localized populations of goose barnacles also hampered the development and implementation of appropriate controls on fishing mortality (Molares and Freire, 2003). Fisheries authorities initially responded to increased exploitation with temporal closures, which proved to be ineffective in curbing overfishing (Freire et al., 2002; Molares and Freire, 2003). The increasing market demand for goose barnacles led to the overexploitation and near collapse of the fishery in the late 1980s (Macho et al., 2008).

To address biological, economic and social challenges, there was an increased commitment by the government to work with *cofradías* to strengthen local management. In 1992, the Galician fisheries ministry developed a catch share program for the goose barnacle, combining secure and exclusive fishing areas (TURFs) with increased government oversight and technical support. The Galician fisheries ministry holds each *cofradía* accountable for managing the resource, marketing its catch and developing annual management plans.

Performance

Since program implementation in 1992, goose barnacle biomass and economic value have increased significantly (Molares and Freire, 2003; Macho et al., 2008). Co-management between the Galician fisheries ministry and the *cofradías* has strengthened the role of artisanal fishermen in the management process. Key benefits from the program include:

- Recovery of goose barnacle populations (Molares and Freire, 2003)
- Profit stabilization (Molares and Freire, 2003; Macho et al., 2008)
- Increased trust and cooperation between fishermen and government (Molares and Freire, 2003)
- Greater accountability and reduced illegal fishing through the development of control points for landings within TURFs and at designated auction markets (Molares and Freire, 2003; Frangoudes et al., 2008)
- Improved conflict resolution among fishermen through increased cooperation and the development of common goals (Molares and Freire, 2003)

The introduction of on-site ecologists has greatly improved the scientific and technical capacity to monitor resources and inform appropriate controls on fishing mortality in a timely manner (Prince, 2003). Funded by the Galician fisheries ministry, the ecologists drive the development of management plans, report regularly on the health of stocks, aid in surveillance and offer technical advice to the *cofradías*.

STEP 1 IN ACTION

Define Program Goals

The Galician fisheries ministry and stakeholders in Galicia identified a variety of biological, economic and social goals when establishing the catch share program for the goose barnacle. The primary goals were to reduce overfishing and restore profitability. Through co-management between the Galician fisheries ministry and local *cofradías*, the program seeks to achieve goals in a way that best addresses local needs.

STEP 2 IN ACTION

Define and Quantify the Available Resource

The single-species catch share program was primarily designed to manage the goose barnacle (*Pollicipes pollicipes*, called *percebe* in Spanish), a highly valued and historically overfished species. The goose barnacle is a sedentary cirripede that grows in dense aggregations in rocky intertidal and subtidal areas throughout the coastal waters of northwest Spain (Molares and Freire, 2003).

Harvestable populations of goose barnacles are found in 32 of the 63 *cofradías* in Galicia (Consellería do Medio Rural e do Mar, 2012; Perez de Oliveira, 2013). TURF boundaries are defined by the traditional fishing grounds of the *cofradías*, covering the intertidal rocks where goose barnacle populations can be found.

To appropriately manage fishing mortality, most *cofradías* enlist a fisheries ecologist (known locally as a barefoot ecologist) to regularly monitor goose barnacle stocks and inform annual management plans. Management plans specify controls on fishing mortality, which include daily allowable catch limits for each fisherman and the expected total catch per year. The expected total catch is based on historical catch data and information generated by on-site ecologists, and is not permitted to exceed the catch from the previous year by more than 10% (J. Molares, personal communication, 2013). Daily catch limits typically range between three to 10 kg per day for each fisherman (Molares and Freire, 2003). With approval of the Galician fisheries ministry, limits can be adjusted during the season in response to detected changes in stock health, shifting market demands or attainment level of the expected annual catch. On-site ecologists regularly provide information on stock abundance, while control points monitor daily landings. The collection of this near real-time data is crucial to informing necessary management changes in daily catch limits. *Cofradías* may also implement a rotational harvest system by designating fishing zones within the TURF and rotating harvests through the season (B. Nieto Novoa, personal communication, 2013).

Although the catch share program has been implemented to manage goose barnacles, *cofradía* members fish for a variety of species within their TURF. Bivalves, gastropods, annelids, algae, anemones and echinoderms are among the additional sedentary species that can be included in the official management plan (G. Macho, personal communication, 2013). To maximize broader ecological performance within their TURFs, some *cofradías* have implemented no-take reserves. The Lira *cofradía*, for example, has established two no-take

reserves in highly productive spawning and breeding grounds in order to promote larval and juvenile spillover to the surrounding TURF areas (Tindall, 2012). The reserves cover 6.75% of total TURF area and are demarcated using topographical features and coordinates (Confraría de Pescadores Lira, 2012).

STEP 3 IN ACTION

Define Eligible Participants

The Galician fisheries ministry has granted area-based catch shares (TURFs) to groups of fishermen organized in *cofradías*. *Cofradías* with harvestable populations of goose barnacle in their traditional fishing grounds are eligible to fish for the species.

Each *cofradía* has general requirements for membership, but typically, anyone who lives in the area can join upon paying membership dues. Individuals must also obtain a harvesting license called a “permex” (for *permiso de explotación*, or license to exploit) from the Galician fisheries ministry to harvest goose barnacles. The ministry considers the applicant’s historical ties to, and dependence on, the fishery when issuing licenses. Individual fishing licenses must be renewed each year and are typically renewed with evidence of fishing activity.

New entrants in the fishery must become a member of a qualifying *cofradía* and obtain a license from the Galician fisheries ministry to access fishing grounds and harvest goose barnacles. New entrants may apply for a new license or purchase a boat with an existing license attached to it (G. Macho, personal communication, 2013).

STEP 4 IN ACTION

Define the Privilege

This program allocates an area-based catch share (TURF) in which goose barnacle harvesting is permitted. *Cofradías* have an incentive and expectation to sustainably manage their TURF boundaries and the fishing activities within. The privilege is granted in perpetuity under the condition that annual management plans are developed and approved each year (G. Macho, personal communication, 2013).

As a condition of holding the privilege and receiving financial support from the government, *cofradías* are accountable for developing management plans. Management plans are designed to ensure that the resource is managed sustainably. They specify:

- Grounds where fishing is allowed
- Method of capture (on foot or on vessel)
- Number of authorized fishermen (by number of licenses authorized)
- Designated control points and points of sale
- Total expected catch in a given year (not to exceed the previous year’s catch by more than 10%)
- Daily individual catch limits

Daily individual catch limits vary in each *cofradía* and typically range between 3-10 kg per fisherman. Fishermen rarely fish every day, and to ensure that daily catch limits do not exceed the total estimated annual catch, daily limits do not accumulate over time and may not be transferred to other fishermen. TURF areas are not transferable from one *cofradía* to another, and fishing licenses for on-foot fishermen are not transferable. On-boat licenses are transferable within a *cofradía*.

STEP 5 IN ACTION

Assign the Privilege

In 1992, the Galician fisheries ministry granted the privilege to harvest goose barnacles to a total of 32 *cofradías* based on the presence of harvestable populations (Consellería do Medio Rural e do Mar, 2012). The Galician fisheries ministry defined TURF boundaries based on the traditional fishing grounds of each *cofradía*. The ministry upholds the exclusive area-based privileges of these qualifying *cofradías* on the condition that fisheries management plans are approved each year.

There has been no formal appeal process for the initial allocation of TURFs, as boundaries have been based on long-established fishing grounds. However, processes are in place for *cofradías* to adapt management of their grounds and for the Galician fisheries ministry to maintain oversight. For example, *cofradías* determine daily catch limits for each individual fisherman and can actively modify those limits within the season with approval by the Galician fisheries ministry.

STEP 6 IN ACTION

Develop Administrative Systems

As longstanding social institutions, *cofradías* were well positioned to carry out many of the tasks required for effective management. Through co-management, the catch share program has harnessed and strengthened the ability of *cofradías* to manage their goose barnacle resources.

Internally, *cofradías* have a representative structure in which all members have voting rights. The executive leadership in each *cofradía* is typically elected every four years, with the president acting as the legal representative of the *cofradía* (Alegret, 2009). *Cofradías* are regulated as public, non-profit bodies, with surplus earnings invested back into the *cofradía* to support operations (Franquesa, 2006).

Each *cofradía* is responsible for developing annual management plans, to be approved each year by the Galician fisheries ministry. To improve catch monitoring, each management plan specifies control points where fishermen are obligated to bring their daily landings for weighing and inspection. *Cofradía* members monitor these control points to record physical size and weight of landings, as well as specific areas fished. In addition to monitoring and sampling conducted by on-site ecologists, this real-time catch information can help detect overfishing and inform changes in management or daily catch limits (Molares et al., 2003).

The cofradías also have a designated market for their catches, known as the Lonxa. To prevent the sale of illegally caught goose barnacles, dealers at the Lonxa are required to show invoices to inspectors to prove their purchases are from cofradías and therefore legitimate. As fishermen are only able to sell their catch at these markets, the Lonxa serves as an additional checkpoint to ensure accountability.

The cost of management is shared between cofradías and the Galician fisheries ministry. Cofradías charge membership dues. The Galician fisheries ministry provides special funds to aid in fishery management, allowing cofradías to hire in-house ecologists and guards to assist with fishery science and surveillance, respectively (G. Macho, personal communication, 2013). Surveillance costs may also be supported internally through cofradía-imposed fines for non-compliance (Frangoudes et al. 2008; B. Nieto Novoa, personal communication, 2013.)

STEP 7 IN ACTION

Assess Performance and Innovate

More than 20 years after implementation, the catch share program is meeting its goals. Goose barnacle stocks have recovered and profits have stabilized. The program has also succeeded in strengthening existing institutions by involving local fishermen in resource management. The program has helped fishermen achieve a higher degree of organization and mutual commitment, which has improved the ability to negotiate at market (Molares and Freire, 2003).

Co-management has enhanced relationships between the fishery stakeholders and has helped align management activities at the appropriate scale. Cofradías are able to set rules appropriate for their local needs, and oversight from the Galician fisheries ministry holds cofradías accountable for developing and implementing appropriate management plans. The financial assistance provided by the Galician fisheries ministry supports the level of resources and capacity needed for cofradías to manage resources effectively.

The introduction of on-site ecologists is another key innovation. On-site ecologists provide frequent scientific monitoring of the resource to supply the high level of information needed to set and modify daily individual catch limits. Because they work within the cofradías and in close contact with the fishermen, the ecologists have developed a culture of understanding and trust between fishermen and the greater scientific community.

Control points for landings help ensure compliance and accountability within the fishery and increase the available data needed to monitor fishery health. Data generated from control points has informed necessary in-season adjustments to management.

While on-site ecologists have been extremely effective, their continued participation faces several challenges. Ecologists tend to have low salaries, insufficient recognition and a lack of long-term funding and resources from the Galician fisheries ministry. In addition, relationships with the cofradías can become stressed when ecologists make catch limit recommendations that fishermen see as unfavorable. Solutions to these challenges will need to be forged to ensure the continued success of the current management structure over time.

Some cofradías have developed more detailed and innovative management plans specifying minimum sizes for goose barnacles or providing for goose barnacle ground restoration activities. The Galician fisheries ministry can highlight and reward cofradías whose management plans result in healthier stocks and more resilient fishing communities, thereby creating an incentive for other cofradías to follow suit. Management plans that are more innovative and progressive can serve as examples, while a platform for information exchange between cofradías can enhance management across the cofradía system.

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