South Brittany

Economic ecology

An experiment with cuttlefish in South Brittany shows that it is possible to harmonize economy and ecology

Ecology, economy and community are three inter-related and indispensable aspects of sustainable development, comprising the three basic requisites of a triangular relationship that must be met if sustainable development is to be achieved.

In the current context, environmental concerns are all too often seen to conflict with economic interests and community needs such as food, income and waste disposal. Fishermen are all too often depicted as being at odds with environmental conservation, despite an obvious linkage between environmental sustainability and economic and social wellbeing. Rather than conserve stocks for tomorrow, fishworkers find themselves under increasing social and economic pressure to catch what is available today—never mind about tomorrow. However, as this article will try to show, fishworkers are all too aware of the need for ecological sustainability to maintain their ways of life. Increasingly, fishing communities are getting involved in promoting sustainable fisheries through self-imposed quotas, voluntary tie-ups, closed areas and the use of selective fishing gear.

From March through June, a seasonal fishery for cuttlefish (*Sepia officinalis*) takes place in the coastal waters off Brittany, when they come to spawn off Finistere. This fishery is not merely a subsidiary fishery, but constitutes an important resource for the fishermen.

There is, however, a problem of large-scale destruction of cuttlefish eggs, which undermines the resource. The traps used in this fishery are the preferred spawning substrate for the cuttlefish. Their eggs are then destroyed when the traps are cleaned, once the fishing season is over. Such destruction could have harmful consequences for the cuttlefish stocks that are apparently still in a healthy condition. A short lifecycle (one to two years) makes the cuttlefish a species whose stock levels can fluctuate considerably from one year to the next. If there are adverse environmental conditions offshore (coastal pollution, for example) during hatching, and they are combined with the destruction of eggs, a decline in the resources could be caused in the following year. Fishermen who undertake this seasonal activity every year are well aware of this problem, and that is what started the project for conservation.

First of all, it was a matter of finding the methods that would allow the eggs to hatch. The experiments undertaken in June-July 1998 did not pretend to provide solutions for managing the species, but showed the willingness and resolve of fishermen to play a role in managing the resource. The exercise consisted of leaving the traps in an area of sheltered water, once the fishing season was over, to allow the eggs to hatch. Monitoring the hatching of batches of eggs stocked in specific areas has provided the basis of this experimentation.

Second phase

In its second phase, the project sought to establish a resource management methodology adapted to the working routine of professional fishermen. With this end in mind, several related projects have been undertaken along the French coastline, where the cuttlefish constitutes a not inconsiderable resource. A synthesis of these has enabled us to make a number of proposals for sustainable resource use, which take into account the everyday constraints of the professionals. To

achieve this, it is necessary to engage in a collective consultation and come up with the most realistic solution, in terms of efficiency and cost.

The common cuttlefish, *Sepia officinalis*, is abundant in the Eastern Atlantic and Mediterranean. It is a coastal species that is found at depths no deeper than 150 m. Its *sepion* (bone) is not resistant to hydrostatic pressure above 15 atmospheres. It lives on the sea bottom, on loose substrates, hiding in the daytime, and coming out at night, except during the breeding season, when it is equally active during the daytime.

The cuttlefish is a coleoid cephalopod mollusc, characterized by tentacles encircling the mouth. Its behaviour is more like that of fish than other molluscs. Octopus and squid are also coleoid cephalopods.

Like almost all cephalopods, the cuttlefish is a predator. It feeds on live prey, mainly crustaceans, fish and cephalopods. The crustaceans are mainly crabs, prawns and, for small cuttlefish, mycids and amphipods. The fish are bottom-living species, sharing the same habitat as the cuttlefish (gobies, wrasses, flatfish, etc), as are the smaller-sized cuttlefish on which they feed. The cuttlefish reproduce in spring (from March to June), but late spawning may take place in summer (June and July). Sexual dimorphism makes it easy to distinguish the sexes: the males are larger with black stripes; in addition, they have a reproductive arm (the ventral left arm) with suction pads at the base; the females are smaller, duller and rounder bellied. Mating takes place head-on (in a head-to-head' position). The male seizes the female by the head, and the arms of the animals intertwine. The male places some spermatophores in the pocket situated under the mouth of the female; the discharged spermatophores are stocked there up to the egg-laying time, which takes place some time after mating.

The females attach their eggs in bunches, using their arms, on various substrates: tubes, seaweed, traps, etc. The external envelope of the eggs is stained black with a little ink. The black coloration and the arrangement of the bunches give rise to the cuttlefish eggs being named "bunches of grapes". The females deposit several hundred eggs during a period of several days. The spent animals die after reproduction.

Impact of traps

Various studies undertaken in the Gulf of Moribihan have shown that traps are the favoured egg-laying sites of the cuttlefish. The impact of traps is, therefore, very important in this sector, where it has been estimated that an average of 28 million eggs are laid every three years on these surfaces. Exactly the same problem is

faced in the estuary of Pont L'Abbé, the difference being that fishing effort is much less than in the Gulf of Moribihan.

The experiments carried out during June and July 1998 were meant not only to ensure the viability of the eggs attached to the traps, but also to allow them to hatch. The operations of hauling and setting traps during the fishing season could have affected the quality of the eggs.

At the close of the fishing season (end of May), 40 traps, each containing around 3,000 eggs, were placed in the lagoon at Loctudy. This lagoon is separated from the sea by a dike that allows access to the traps on foot at each low tide. What is more, the lagoon is in direct contact with the open sea, so that each high tide covers the dike. This allows the young cuttlefish to return to the open sea.

Ten traps were used in the study; the other 30 were immersed in the lagoon. A *vivier* (container) made from plastic meshes was attached in each of the 10 (test) traps, in which were placed 300 eggs taken from the test traps. The mesh size of the *viviers* was small enough (0.5 cm) to prevent the *seichons* (hatchlings) from escaping.

The experiment was initiated on 14 June, and, from that day onwards, the hatchlings were released every two days. The experiment was terminated on 18 July, by which time all the eggs placed in the *viviers* had hatched.

From the first days onwards, the experiment released 30 to 40 hatchlings. After the end of June, the number declined. It is important to note that the incubation time for the eggs depends on the water temperature, and, in the lagoon, this is higher than in the natural marine environment, where the hatching period is slightly longer. The hatching rate achieved—95 per cent of the eggs hatched—was excellent.

It is only thanks to the goodwill of a few concerned local fishermen, supported by the local and regional fisheries committees, that these experiments were repeated during the 2000 fishing season (March to June) on the Loctudy site. Promoting the hatching of eggs attached to traps seems vitally important for recruitment and, thus, for the regeneration of stocks.

Using the sites least favoured for the storage of traps at the end of the fishing season, and placing removable collectors inside the traps (which are replaced once filled) might allow the harvesting of a large number of eggs. Structures adapted at low cost, to which the collectors may be fixed (for example, oyster tables, structures generally used for seeding oysters) might allow us to maximize the hatching rate of the batches of cuttlefish eggs.

In the Gulf of Moribihan in South Brittany, grilled, 3 x 1 m structures, equipped with floating cords of 30 cm (acting as egg collectors), are immersed when the first cuttlefish arrive (March) and collected at the end of the hatching period (July). This method avoids a larger number of operations.

We have promoted the above two methods because they allow the capture of cuttlefish, while allowing them to spawn; basically, once a cuttlefish has laid its eggs on an external surface, it will no longer enter a trap, and will die soon after.

Ecology and economy—don't they both share the same etymological roots? Harmonizing the two will surely provide us with the means for exploiting all fishery resources in a sustainable and efficient manner.

This piece, by José Gouyen(**jose.gouyen@libertysurf.fr**), a small-scale inshore estuarine fisherman from Southern Brittany and a member of the Colectif Pêche et Développement, has been translated and adapted by Brian O'Riordan