Swansea University
Prifysgol Abertawe

Case Study: Mussel Farming in Menai Strait and Conwy Bay SAC

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Lantra

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pp4sd
PROFESSIONAL PRACTICE FOR SUSTAINABLE DEVELOPMENT

The Lolipop
Source: James Wilson

"The problem was that seeding and harvesting overlapped and we really needed a second vessel, so the concept of Lolipop was born; a dedicated harvesting barge optimised for the Menai Strait." Kim Mould explains, "We talked to our builders Maaskant in Holland about the proposal and together we came up with a plan for an automatic dredging system mounted on the stern of a shallow drafted, highly manoeuvrable, electrically driven craft. The dredging system only requires finger input from the wheelhouse; no one has to go near the dredges, improving safety enormously and enabling fishing to be performed in all sea states. With a crew of only two Lolipop can harvest, wash and bag 20 tonnes of mussels per hour. Maaskant subsequently adapted the concept for an oyster vessel in Holland, which won Dutch Ship of the Year 2006. Teaching the Dutch innovation in fishing, that's something!"

Business Benefits

By working together the group ensure optimal use of resources and benefit greatly from each other's expertise. Together they present a united front when faced with problems and the support they give to the other companies farming mussels in North Wales is an illustration of their commitment to the future of the industry. Together, by their adoption of new technology, up-to-date machinery and forward-thinking business practices, they have rejuvenated mussel farming in North Wales, and now produce around 75% of the UK annual harvest.

Environmental Benefits

While realising that any farming activity must exert environmental and ecological change in the area it covers, the mussel farmers in the Menai Strait take care to keep negative effects to a minimum. No aggressive measures are employed against predators, except the pot method employed to reduce green crab numbers, which as a low-impact traditional fishing method is considered relatively benign by the companies. This process also supports its own small business and employment for one.

According to researchers from the School of Ocean Sciences in Bangor [5], *"the main direct impact of seed mussel exploitation is through dredging, which releases sediment into the water column. However the accumulation of mussel mud in seed beds detaches the bed from the substratum, meaning that dredging can often leave the underlying (pre-settlement) substratum relatively undisturbed. The main impacts of seed mussel exploitation are likely to be indirect ecological effects."*

[5] http://www.seafish.org/upload/file/main/Seed_mussel_review_June04.doc

Opportunities for the Future

Although there is no space within these mussel beds for expansion at present, there could be some limited medium-term opportunities for developing the industry in other areas of Wales. There has already been some activity within the confines of Swansea Bay, in South Wales. However, given that this is an area of occasionally high wave energy, results have been haphazard. Although it is a high-risk policy, as the returns from developing beds are dependent on weather patterns and the supply of seed mussels, there could be increased production off-shore. New technology is also being developed to encourage on-shore farming, using cages, but is yet untried in practice.

Some increase in markets could occur, as supermarkets are changing their approach to buying locally-produced and locally-sourced foods. There is no reason why this trend should not include Welsh seafood, including mussels, oysters and other shellfish. There could also be an expansion in local Farmers' Markets' direct selling to the public. Increasingly, the idea of promoting a healthy, fresh, locally-sourced shellfish product to quality restaurants and hotels becomes attractive.

At the moment, the future is uncertain, and the partnership is primarily occupied with ensuring their continuation as viable businesses, and preserving their niche in the market.

There has been some research undertaken in the United States and in Sweden that has considered the potential of mussel farms to act as bio-remediators, utilising the mussels' feeding habits in removing the excess nutrients that result from coastal urban development and for carbon sequestration.

Case Study: Mussel Farming in Menai Strait and Conwy Bay SAC[1]

Introduction and Background

The Menai Strait separates the mainland of North Wales from the island of Anglesey. The stretch of the Menai Strait between the coastal towns of Bangor on the mainland, Beaumaris on Anglesey, and out into the Conwy Bay, is now the location of the largest mussel fishery in Britain.

There are three fisheries within the boundaries of this Special Area of Conservation (SAC), each of which is managed by the regulatory body, the North Western and North Wales Sea Fisheries Committee. One is managed as a 'regulated' fishery, two as 'several' fisheries. These different legal management arrangements have different implications, including in terms of the sustainable management of the fisheries.

Top: lifting spat into the boat. Bottom: spat being re-laid by washing back out with sea water.
Source: Swansea University.

In Conwy Bay a regulated fishery allows a limited number of licensed fishermen to rake mussels from partially-cultivated beds. This is a traditional activity, the roots of which go back some 400 years. Mussel production from this area is in the range of 200-400 tonnes per year, most of which is cleaned (depurated) locally and sold within the UK.

In the Menai Strait West fishery area, two small companies are engaged in the cultivation of Ridged Pacific Oysters (50 tonnes per year) and mussels (250 tonnes per year). (A case study on one of these, Menai Oysters and Mussels, is also available; see the PP4SD CD or www.pp4sd.org.uk)

In the Menai Strait East area, four companies that cultivate mussels operate from Penrhyn Docks (Bangor). They are Myti Mussels Ltd, Deepdock Ltd, Extra Mussels Ltd and Ogwen Mussels Ltd.

These companies operate according to the specific legal requirements of a so-called 'Several Order'. The granting of such an Order by the local Sea Fisheries Committee gives exclusive access to a group of fishermen or individuals to exploit a specified shellfish species in a clearly defined area. It also removes temporarily the public right to gather the specified shellfish species within that area. The Menai Strait East Order area produces 7-10,000 tonnes of mussels annually, which represents 60-75% of the total UK production of farmed mussels.

Several powerful state-of-the-art mussel-dredgers are based at Penrhyn Docks, and these have enabled the levels of production from the area to be sustainably maintained for over twenty five years. These vessels have also assisted the traditional mussel fishery of the Conwy estuary.

For centuries the re-laying of the tiny 'spat' (small juvenile mussels) from intertidal areas into the deep-water areas ('lays') where the increased flow of water provides enough nutrients to accelerate development of the mussels (they will grow to market-size within twelve months), was all done by hand. This involved raking small amounts of mussels (10cwt, or 0.5T) into and then from small (15ft, or 5m) flat-bottomed mussel boats. This was a very laborious task that was considered inefficient in the modern age, and consequently the industry became moribund. The dredgers are now re-laying several hundred tonnes of seed in a few days, instead of many months, thus rejuvenating the industry in North Wales.

[1] Special Area of Conservation, designated under the EC Habitats Directive (Council Directive 92/43/EEC)

The Practice

The process of mussel farming involves:

- Identification of the ephemeral seed-mussel beds (in the case of these four companies, by walking areas on low spring tides; helicopter surveys in Morecambe Bay (northwest England), Carmarthen Bay and the Pembroke Coast in Wales; or by using on-board sonar and camera equipment)
- Applying for access to the seed areas, requiring consultations with the local Sea Fisheries Committee and the appropriate statutory nature conservation and access agencies for England and Wales (the Countryside Council for Wales and /or Natural England, depending on the location of the seed bed)
- Harvesting of the seed mussels by dredging
- Laying down the seed mussels in the Menai Strait
- Redistribution of the crop from shallow waters to deeper waters for final growth
- Export to, and processing and distribution in, the Netherlands.

Unlike other forms of shellfish harvesting such as cockle suction-dredging, mussel dredging is considered a more benign, less invasive method of harvesting by these companies. Mussels are filter feeders; that is, they derive their nutrition by filtering naturally occurring particulate matter from the water. Mussels will then excrete undigested waste matter or digested faecal matter from their body cavity. This faecal matter quickly accumulates and develops into a thick layer of mud (known as 'mussel mud'). To harvest the animals, the mussel dredge tows through this mussel mud and thus does not invade the original sea floor. The majority of the harvest (which can be up to 75% of the total British crop) is then sent to the Netherlands for depuration.

Depuration is a process of cleansing the mussels by placing them in water that has been subject to UV sterilisation. It is required in the UK under the Shellfish Hygiene Directive which protects consumers of shellfish by laying down health conditions for the production and placing on the market of live bivalve molluscs intended for human consumption. The Directive stipulates that shellfish may only be harvested from areas that have been monitored and classified in accordance with a system administered by the Food Standards Agency. (DEFRA 2004)[2] *Bivalve production areas (including mussels and oysters) are classified according to the level of treatment they require prior to their sale. Local authorities collect this information and send it to the Food Standards Agency who compile a national picture. Standards are set in terms of concentrations of coliform bacteria and* Salmonella. *Harvesting sites are classified from A to C, where grade A sites don't require pre-treatment and grade C sites require intensive purification.* (Environment Agency 2008)[3]

As all sites in North Wales are classified B, depuration of the mussels and oysters produced there is required prior to human consumption if they are to be eaten 'fresh' from the shell. Once this depuration process is completed, most of the mussels are exported to European markets in France, the Netherlands and Belgium, but some are returned to the UK where local retailers, hotels and restaurants are supplied with prime quality, cleaned, live mussels.

[2] http://www.defra.gov.uk/environment/water/industry/review/pdf/min_guidance.pdf

[3] http://www.environment-agency.gov.uk/yourenv/eff/1190084/water/213925/578455/578553/578733/?version=1&lang=_e

Challenges and Pressures for Change

- A 450-berth marina, proposed by a local Boat Company based in the town of Beaumaris, has been granted planning permission for development; at the time of writing (March 2008) the proposals are under review
- Negative public perception, for example concerning dredging and food miles
- Lack of a sufficient UK market because there is little interest in shellfish as part of the diet
- Loss of mussels to natural predation
- Lack of easily available grants to further develop the business
- Once seed stock has been identified, there are considerable delays - typically a minimum of 28 days - before permission is obtained to harvest it, due to the amount of bureaucracy required. Delays can result in the disappearance of the stock due to predation, weather conditions or other factors
- The lack of a local marine manufacturing industry, and the globalisation of manufacturing, means that the boats are built overseas, in Poland and China, and the electronics and engines are made in the Netherlands.

Some Sustainability Considerations

The key to the success of the Menai mussel farmers is their commitment to the industry, the cooperative approach of those in the industry within North Wales, and to the enlightened informed approach of both the Sea Fisheries Committee and Countryside Council for Wales. Together the companies have invested a great deal of money improving the fleet and developing the business. They are well aware of the importance of integrating sustainable practices in their widest sense into everyday business. However, some of the unsustainable issues remain beyond their control at present.

The lack of a local marine manufacturing industry and the consequent requirement to go overseas for their boats, electronics and engines is seen by the companies' directors as a missed opportunity for the Welsh economy.

Depuration of the mussel harvest takes place in the Netherlands, thereby increasing the food miles of the finished product. This is essential at present, because suitable facilities for depuration are not available in Wales. The large capital investment and infrastructure costs of building such facilities are beyond the means of the mussel-farming companies themselves, and are not understood to be on the agenda for the Welsh and UK Governments at present.

The uncertainty created by the issues surrounding the proposed development described below also make any medium- to long-term investments highly uncertain. A proposed marina development in the Menai Strait is believed to present a significant threat to the mussel farmers. Possible negative impacts include:

- The overturning of the Several Order, resulting in unregulated public harvesting of the transplanted mussels
- Threat of bacterial and other pollution of the water from the increased boat traffic
- Mooring of boats over the mussel beds, restricting access
- The proposed marina would also bisect the current mussel beds, and greatly inhibit their use.

The issue has been highly emotive. At the time of writing, the outcome of a legal case, following a judicial review, and its effect on the industry, remain to be seen.

The cooperative approach within the industry in North Wales is well illustrated by the annual relaying of mussel spat by the group based at Penrhyn for the Conwy fishermen. Depending on what there is to be moved, 3-400 tonnes of mussels are relayed using the boats from Penrhyn, from the high intertidal zone down to a deeper area where the mussels can both grow more effectively and also be accessed more readily by the Conwy fishermen.

The control of the foremost predator of mussels, the green crab, has resulted in the development of another small business venture in the Menai Strait. With support from the mussel farmers, green crabs are harvested and quickly frozen and exported to France for soup production.

All the mussel companies have benefited from the close proximity of the School of Ocean Sciences located at the university in Bangor. They have developed strong research links there, as well as with other universities in Wales. The companies contribute whenever possible to research, benefiting the industry in general.

In 2007 Kim Mould of Myti Mussels and James Wilson of Deepdock were shortlisted for a prestigious award for innovation (see press report, below). Kim said, *"We came up with a plan for an automatic dredging system mounted on the stern of a shallow-drafted, highly manoeuvrable, electrically-driven craft. Maaskant (their builders in the Netherlands) subsequently adapted the concept for an oyster vessel in the Netherlands, which won Dutch Ship of the Year 2006."*

Well done Wales![4]

Congratulations to Deepdock and Myti Mussels in Wales for their achievements. Both companies have been short-listed for an *Aquaculture Today* Fit for the Future Award. Shellfish award nominee, James Wilson of Deepdock in Wales, is "proud to be associated with the responsible and sustainable use of the marine environment", which he believes is "integral to the achievement of successful bivalve mariculture."

Innovation award nominee, Kim Mould of Myti Mussels, was also thrilled to be short-listed. "Myti Mussels commenced trading in 1982, so we are celebrating 25 years in the business this year. Initially a trading company it soon became apparent that it would be necessary to supplement available wild capture mussels with our own farmed production. Back in the 1980s the only vessels available for large scale cultivation were second-hand Dutch dredgers that would not comply with UK fishing vessel safety rules."

So, over the years, Myti Mussels have commissioned their own purpose-built mussel boats. With each vessel, Myti Mussels have increased carrying capacity, transformed farming operations, and ultimately increased production and quality. In 2003, they took delivery of a state-of-the-art 43 metre boat, *Valente*. *Valente* was built in Holland for open sea voyages carrying 250 tonnes of seed, with advanced features such as automatic ballast systems and a novel cutter bow for increased speed, sea keeping and economy. She also was equipped with a removable washing system for harvesting duties.

[4] http://www.aquaculturetoday.co.uk/news/fullstory.php/aid/161/Well_done_Wales!.html