Bream Bay Aquaculture Park Case Study

Bream Bay Aquaculture Park: Does being close enhance research provider and industry collaboration?

By Kathryn Nemec

Introduction

Strong relationships between industry and science providers are recognised as a key determinant of research utilisation and innovation. Different models can be used to build industry-science relationships, one of which is to link research organisations and a cluster of local industries. A recent OECD report on industry-science relationships notes that the most successful industry-science partnerships involve links between publicly financed research organisations and a cluster of local industries.¹

This model is being implemented at the Bream Bay Aquaculture Park (BBAP) and provided a good opportunity to explore the factors that underlie and enhance industry-science relationships. A particular feature represented in this case study was the positive influence of physical proximity and co-location on organisations based at the aquaculture park.

The Establishment of the Bream Bay Aquaculture Park

The BBAP was officially opened on the 24th April 2002. The park was an initiative by the National Institute of Water and Atmosphere Ltd (NIWA) to establish an aquaculture development site – providing core facilities, infrastructure and skills to companies wanting to develop new commercial opportunities. The plan was to develop an incubator and cluster concept, with scientists, companies and students working together.

The park was located in a rural setting next to the beach on the outskirts of Ruakaka, a small seaside town located between Auckland and Whangarei. The site was dominated by the adjacent power plant owned by Mighty River Power Ltd, with massive buildings that overshadowed the park. Mighty River provided sea wells and the pipe system that transports seawater onto the aquaculture park (which is leased from Mighty River Power Ltd), and NIWA monitored the seawater for any transferable, water borne disease. In addition to ‘clean’ sea water, NIWA supplied compressed air, filtration equipment, pumps, fresh water, and electricity (and supply back up) to companies on site. The facility had four separate buildings which covered

an area of 3000m$^2$, including a hatchery, nursery, office space, conference room, accommodation, wet and dry laboratories, a workshop and storage area.

*The hatchery and nursery complex has extensive live-feed production facilities, including those for many microalgae species. The hatchery has specialised finfish and shellfish research and production areas, and a heat and light controlled broodstock room for out-of-season spawning. There is also a wet laboratory and dedicated marine pathology unit with quarantine facilities for when animals are brought on site from the wild. Overseas experts helped to design the concrete floor of the hatchery, which has an extensive drainage network.*

NIWA Fisheries and Aquaculture Update. No.1, 2002.

When companies moved on site, NIWA constructed buildings according to their specifications, and the company leased them from NIWA. This was a particularly beneficial arrangement for companies that couldn’t afford the capital outlay for a production area. Once built, the companies run their operations within their designated areas.

NIWA had 22 staff based on site, including marine biologists, technicians, and hydrologists. A regional manager, hatchery manager, and administrative staff were also based at the aquaculture park. NIWA staff undertook their own aquaculture research and production projects, or projects in conjunction with the companies on site. In addition, they were available for consultancy work for on site companies.

The concept of an aquaculture park was not entirely new to NIWA. In addition to the BBAP, NIWA had operated a marine aquaculture facility at Mahanga Bay, Wellington, for many years. However, Mahunga Bay had limited capacity to expand, and sea temperatures were cooler than Bream Bay. In addition, NIWA wanted to establish an aquaculture park that was capable of extending aquaculture products, developed with intellectual property from NIWA’s research activities, to commercial scale production. In about 2000 NIWA started to look for a second site; one that would also be suitable for kingfish fingerling production, along with the potential to be used for a range of other aquaculture species.

**Who was based at the Bream Bay Aquaculture Park and what were they doing?**

In addition to ensuring the park runs smoothly, and providing infrastructure, skills and expertise, NIWA also had some commercial interests on site. One of them was producing yellowtail kingfish fingerlings, which were then on-sold to kingfish farmers. Kingfish were a prized fish for sashimi in Japan, and while other countries grow them, excellent stocks of them exist naturally in the waters around Bream Bay. Indeed, the first pilot scale commercial production of yellowtail kingfish in New Zealand was developed at the aquaculture park.

NIWA were also involved with developing:

- Technology for growing eels. The elvers could potentially be on-sold to commercial growers.
➢ Single seed oyster hatchery.
➢ Aquaculture system for producing flounder.

OceaNZ Blue Ltd (referred to as OceaNZ from here on) was one of two companies based at the aquaculture park. ‘The company was established in 1999 to commercially produce paua (a native abalone), beginning with feral broodstock, and farming them through to marketable size. This involves the spawning, settling, on-growing, processing, and marketing of premium quality paua to international markets. Paua is a much sought after shellfish but natural global resources are being depleted rapidly whilst consumer demand worldwide is increasing’.

OceaNZ specifically chose the aquaculture park on which to establish their business because:
➢ They could access water supply and infrastructure.
➢ Buildings could be leased from NIWA and built to OceaNZ specifications.
➢ Access to NIWA’s paua breeding expertise that had been developing at Mahanga Bay since the 1970s.

NIWA conducted a range of different research projects and consultancy assignments for OceaNZ. For example they had a Foundation for Research, Science and Technology (FRST) Technology for Business Growth (TBG) grant which provided some financial support for investigating selective breeding in paua.

The research and development input was critical for OceaNZ.

\[\text{We conceptually know what to do, but practically don’t know how to do it. The need for research and development is strong as we need to be fine tuning the principles. ... we don’t want to reinvent the wheel, but we need to make it better. (OceaNZ)}\]

OceaNZ were planning to sell their first paua in 2006, and start to see financial returns on their investment in 2007. Ninety percent of their product would go to Japan. However, the Japanese prefer white abalone, which is another species of paua that doesn’t grow in New Zealand waters. As a result, OceaNZ were planning to conduct research on breeding a white paua from the New Zealand species with NIWA.

Sealord Shellfish Ltd was also based at the BBAP and had established a greenshell mussel hatchery, which was still in the research and development phase but with a view towards producing commercial volumes of spat. They had developed their own techniques for producing mussel spat. As for OceaNZ, their establishment on the site did not require capital outlay, but did require Sealord Shellfish Ltd to ‘fit out’ the building and ‘reduced the time to set up the hatchery’. In addition to the mussel hatchery, Sealord Shellfish Ltd and NIWA also had a joint venture, funded through a TBG grant, to conduct preliminary investigations into the feasibility of growing hapuka commercially.

The main attraction for Sealord Shellfish Ltd to move on site was the infrastructure and facilities, rather than the opportunity to be located close to a science provider.

\[2\text{ www.oceanzblue.co.nz}\]
This is understandable as they already had significant internal research capacity, but they did enjoy the accessibility of ‘extra hands to help out for a few hours at short notice’.

While it didn’t eventuate, Moana Pacific Fisheries Ltd was also a potential partner on site during the early days of establishing the BBAP. In fact they were instrumental in encouraging NIWA to consider supply of kingfish fingerlings as a commercial enterprise as Moana Pacific could see the market potential. However, due to the difficulty Moana Pacific experienced with obtaining consent to establish a kingfish farm in coastal waters nearby, they decided not to proceed.

**Three Stakeholders – Three Different Relationships**

The relationships between the organisations were all different due to the type of organisation and the nature of their work.

**NIWA and Sealord Shellfish Ltd:**

Sealord Shellfish Ltd was a large organisation with parts of their operations scattered throughout New Zealand. As such their operations at the BBAP represented a very small aspect of their business. They had 3 people on site; the manager of the mussel spat hatchery project, and 2 technicians. The relationship between NIWA and Sealord Shellfish Ltd on site was mostly informal (i.e. structured meetings weren’t held), with daily and continuous communication to resolve tenant-landlord, and purchaser-supplier issues. The NIWA and Sealord Shellfish Ltd hatchery managers had worked together previously, which enabled issues to be raised and discussed in an open manner.

**NIWA and OceaNZ:**

OceaNZ was a young start-up company, backed by a group of investors, and their entire operations were based on site. There were approximately 5 employees. Compared to Sealord Shellfish Ltd, their business with NIWA was undertaken with a more structured format, with regular meetings to raise and discuss issues. Regular and informal contact with NIWA staff also took place on a daily basis.

As OceaNZ didn’t have internal research capacity they utilised the skills and expertise of NIWA, both formally and informally. For example, when OceaNZ moved on site they engaged NIWA to help investigate and resolve problems as they were identified by OceaNZ. They paid a lump sum that enabled them to have ready access to NIWA’s knowledge and expertise, especially regarding growing paua. This was especially important during their implementation phase as problems and issues were arising on a regular basis. Once the set-up phase was completed, and the focus of the business changed to ongoing improvement and fine tuning of the operating systems, their relationship with NIWA changed. They subsequently used NIWA as consultants for specific problems on a contract basis. This work involved designing or improving the efficiency of a piece of equipment, resolving a water quality issue or staff training. While OceaNZ didn’t have a preferred supplier agreement with NIWA, they acknowledged that they wouldn’t enter into a competitive tender situation with anyone else, unless NIWA was unable to supply the required services.
We have a good relationship with them – this is more important than saving a few dollars. (OceaNZ)

Sealord Shellfish Ltd and OceaNZ:

The relationship between Sealord Shellfish Ltd and OceaNZ was moderated by commercial sensitivity. And while the social contact and a very positive working relationship, especially in a remote working environment, was highly valued, there were limited commercial benefits.

Professionally we don’t go into their site and visa versa. We need to consider commercial sensitivity arrangements. However, benefits from being alongside another operation mean that there are resources to call on in case of an emergency. (Sealord).

Benefits of Co-location at the Bream Bay Aquaculture Park

Physical proximity and co-location of the companies at the aquaculture park were a key feature of this case study and provided the opportunity to explore how this facilitates industry-science relationships.

Opportunities for Communication:

The benefits from ongoing and informal communication that resulted from the organisations being located within the same site cannot be underestimated. There were numerous opportunities for staff to interact in an informal manner in the shared lunch and kitchen area, when walking around the site, or in the administration/office building. In addition, the rural location and isolation of the BBAP created a sense of camaraderie, and increased opportunities for socialising together, whether at the pub or community sports events which provided further opportunity to cement relationships. Indeed, the boundaries between formal and informal channels of communication overlapped as conversations about the content of formal meetings (i.e. projects, outstanding issues) were continued in informal settings. It was noted that this was reinforced by being able to interact easily with people at a range of different levels ‘from people on the floor to doctors in genetics. Everyone is approachable’. (OceaNZ).

OceaNZ in particular valued the informal communication that took place concerning their projects.

We had a problem with chlorinated tanks in the nursery - they had to be sterilised and then chlorinated. We were washing away and flushing, and scrubbing out the tanks with bleach in a very laborious way. In the smoko room we asked them how they’d do it and do you mind spending half an hour showing us how to do it. We wouldn’t have heard about the procedure they said and it has speeded up our process. We’re the recipients of a lot of good information just because we’re on site, and we don’t pay for it. (OceaNZ)
While acknowledging that they were recipients of valuable information as a result of being on site, OceaNZ also believed that NIWA benefited from these exchanges. For example, NIWA could observe and be part of the issues and challenges of operating a commercial venture. These comments implied an implicit agreement to exchange information in order to build a sense of reciprocity and goodwill.

**Relationship Building:**

Communication helped to build relationship between individuals and organisations on site. Other elements also contributed to building relationships. These included:

- **Organisational culture:** A strong informal ethos held sway at the BBAP and within the organisations on site. It was noted that this was distinct compared to head office cultures that were more established. The isolated location provided the opportunity for distinct organisational cultures to develop. In general, this is not an unusual scenario for organisations – different cultures emerge at different locations. The distinction between the local and head office perspective of the site was illustrated by the following comment:

  *At the informal level there are no barriers in the smoko room, problems are being discussed, solutions offered, the information is flowing. However, at a formal level, there is no contact at all. When the head people come we show them around so they can see the potential, but at a corporate level there are no advantages or benefits of working together.* (OceaNZ)

- **Organisational investment in research and development:** For all three organisations, research and development was a critical element of their business and their ability to be innovative, i.e.
  - NIWA was a research organisation,
  - Sealord Shellfish Ltd stood out as one of the few seafood companies that invest significantly in research and development, and
  - the innovative nature of OceaNZ’s enterprise meant research and development was essential.

**Technical Input:**

As noted previously, the technical input from NIWA was especially valued by OceaNZ.

*We're learnt how to spawn paua from NIWA staff. Wouldn't have been able to do this. Also how to settle the animals in the tank. Settling is the most difficult aspect of the process. In the beginning it was a dream to get this up and running. There was a lot of work that went into the practicalities of figuring out how to actually do it. Still get people from NIWA to help us. Some of the really innovative aspects of the project are now complete – now the key issues concern ongoing improvement and how we're going to make it better.* (OceaNZ)

The above comment highlights how different types of technical input were required at different phases of development. OceaNZ relied significantly on NIWA’s paua growing expertise in the past, and acknowledged changing research needs as they
entered the improvement and fine tuning phase of their development. Certainly NIWA was well placed to meet changing needs as it offered an extensive range of different disciplines, expertise and technology. For example, NIWA had recently developed a unique seawater cleaning pump for OceaNZ.

It’s very unique in the world, very few people have this. NIWA gave us all the advice for this and give us ongoing training in monitoring the pump. (OceaNZ)

In addition, the NIWA network was extensive, with people based throughout New Zealand.

We use NIWA people from all over New Zealand, use water quality people, abalone people in Mahunga Bay. People on this site have specific knowledge, but others have more relevant knowledge for our business. (OceaNZ)

**Problem Resolution:**

We interact with our commercial partners on a daily basis. We’re the first to hear if there’s a problem. We work on the problem together – it’s not just a NIWA problem, it’s a shared problem. (NIWA)

However, it was acknowledged that getting to the point of it being a shared problem had taken a lot of work, mostly communication in an ongoing and consistent manner.

Most problems had been associated with microalgae production, a living food used in raising juvenile fish and shellfish. However, systems and methods for production were constantly being improved. Issues raised generally related to customer service, especially managing clients’ competing demands. In addition, combining production and research in the same facility also leads to competing demands for microalgae.

In a commercial operation scenario it is straight forward. You’re trying to maximise production for a minimal outlay. However, in a research operation, you’re producing what you need for the research, and this is often high cost. As a result, commercial production of microalgae, and production of algae for research purposes do not sit side by side. And the algae room is producing algae for many different species – it’s not dedicated. (Sealords)

**Opportunities to Access Networks at the Bream Bay Aquaculture Park**

Being close to NIWA has bought a range of opportunities for companies at the BBAP to access networks and other resources. In some cases, the advantages from these opportunities weren’t appreciated until they’d moved on site.

**Access to National and International Networks:**

NIWA has access to an international network of scientists and people with experience in aquaculture. It provided the opportunity for cross fertilisation of ideas, experience and insight.
We can sit up here in splendid isolation but we always need more exposure. NIWA is bringing in new people and we can see that making a difference. New people are coming in with commercial experience and they have a very practical orientation, making small adjustments that help immensely. (Sealords)

In addition, NIWA had the ability to recruit international expertise for a particular project. For example, if a company structured their project with TBG assistance funding in partnership with NIWA, then NIWA could then recruit the appropriate expertise to the project.

Direct and bottom line benefits were attributed to having access to such a network. OceaNZ noted that this had enabled them to implement a ‘world class water recirculated system’. This had reduced costs and enabled the company to achieve more control over the life cycle and growth during the whole year. They noted that ongoing access to technology would enable continual improvement.

Access to Students and Other Resources:

The BBAP provided a focus for research activities with other institutes, such as the School of Marine Science at Auckland University, and the Auckland University of Technology. Doctorate and masters students conducted research projects, and students undertook work experience at the BBAP. Work experience in an applied research and commercial environment was noted as a valuable asset for graduates, and provided a resource for NIWA and companies based on site to utilise. This was a significant contribution to the sector as a whole. The importance of the provision of graduates cannot be underestimated. An OECD report noted that the provision of skilled graduates is essential to companies wishing to ‘adopt new technologies, new instruments and methods for industrial research and an increased capacity for problem solving’.

Other Crown Research Institutes could also be encouraged to work on site in collaboration with commercial partners and NIWA.

Visiting international scientists had also worked at or visited the park. All companies based on site had ready and easy access to the skill and expertise of visiting scientists.

Raising Profile:

Joint ventures between companies and NIWA at the BBAP implied common and vested interest in project success. Knowing that positive spin-offs (i.e. more companies moving on site, enhanced reputation) can be derived from successful projects motivated partners to be equally concerned about success, of their partners as well as their own. Joint ventures on site raised the credibility of all partners as it demonstrated their ability to work together in a productive manner.

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They have also got credibility riding on having a success story right beside them, and they’re helping us. (OceaNZ)

Managing Intellectual Property

Most of NIWA’s work at the BBAP was undertaken as part of joint ventures with companies. Therefore ownership of intellectual property (IP) was governed either as part of a specific project’s IP agreement, or established as a more general IP agreement between NIWA and covering all the companies operations on the site. Difference in IP arrangements differed between the companies, and the stance of each company in relation to IP (and commercial sensitivity) was treated with respect. For example, the Sealord Shellfish Ltd mussel spat hatchery work was commercially sensitive, and only Sealord personnel entered their area at the BBAP. On the other hand, OceaNZ had a very different approach.

*We want to shout our success to the world – we’ll share our knowledge with anybody. We’ll share our knowledge about how to grow them.* (OceaNZ)

*For us the more paua farmers there are with quality standards, the better.* (OceaNZ)

For OceaNZ, they owned IP in relation to gene marking. In the future it was anticipated that IP was more likely to concern management systems and marketing.

The difference in IP between the companies on site possibly reflected the different life cycle of the business in relation to the species. Certainly growing paua commercially was a very new venture compared to growing mussels commercially. Due to the number of companies now growing mussels, the effort to achieve competitive advantage becomes more critical, and IP becomes increasingly valuable.

Issues Emerging and Areas for Improvement

Lack of Formal Agreements during Set Up Phase:

The rush to get the BBAP operational during the set-up phase meant that some agreements were made in principle and on the basis of a handshake. This was in response to the need to resolve some issues urgently. *Things were developing so fast that when it was realised something was needed it was a matter of urgency.* (NIWA) However, recollection of what was agreed differed over time. While such an approach was in keeping with an informal operating ethos and an emphasis on the establishment of goodwill at the beginning, there were risks associated with this approach. And while it didn’t lead to any major problems, it did need to be rectified after the event. With the wisdom of hindsight, it was acknowledged that written agreements would have made resolution easier. Agreed service specifications for microalgae supply was also identified as an area that could have been formally agreed at the beginning.
Impact of Growth of the Bream Bay Aquaculture Park on Relationships:

The BBAP was expanding quickly, and if the site continued to expand, additional buildings would need to be built. Growth would need to be balanced with ensuring daily interaction between personnel on site was maintained. It was apparent that this feature of the site was highly valued. A future scenario is that each new entrant to the BBAP has their own compound, which may in fact be a necessity for biosecurity reasons. However, even if this does eventuate, mechanisms for ensuring regular contact between companies and NIWA, and between companies, should be considered.

Growth would also impact on the way in which NIWA engages with companies based at the BBAP. For example, NIWA conducted projects in response to problems identified by OceaNZ. However, this would change if the BBAP grew and more demands were placed on NIWA. This would require NIWA to development new systems for how they respond to such requests, while at the same time managing the informal, but highly valued aspect of their relationships with companies on site.

Developing Commercial Experience:

NIWA’s need to develop commercial experience was noted on several occasions. For example, NIWA were still building a culture of delivery and customer orientation, rather than a culture of ‘got the funding and expectations for delivery are low’.

They’re excellent technically, but the commercial side to their business is limited, they learn from us about how to do it commercially, i.e. how to grow larvae into a production line. (OceaNZ)

For example, some of the spawning work done on site was highly timing dependant and delivery of services by NIWA cannot be delayed. For example, the consequences of not spawning would impact 3 years down the line.

If something doesn’t happen now it has to happen in the next minute.
(OceaNZ)

However, NIWA were learning from exposure to commercial operations. Indeed, OceaNZ believed that NIWA benefited from them being on site, especially with regard to operating in a commercial environment.

Discussions we have and questions we get indicate they … want to learn about the commercial aspects of the business. (OceaNZ)

It’s all very well to do research, but the challenge is to make it commercially viable, and that’s a struggle for NIWA. These issues get bought up as part of informal interaction and makes NIWA aware of the reality – that if you don’t get it right you fail. (OceaNZ)

Linked to the development of commercial experience was the growth of a customer service ethos towards companies on site. A respondent from OceaNZ commented that:
We can be treated like a subsidiary of NIWA rather than a customer – can be a bit relaxed towards us. People can overlook things – which can happen in any operation.

Other aspects of developing a commercial focus that were raised included:
- Develop long term markets for species being developed on site.
- Develop plans for scaling up from experimental aquaculture systems to commercial level production.
- Maximise marketing opportunities from the number of national and international visitors to the BBAP.
- Attract more companies on site.

I wonder how many people even know this is here, even in the seafood industry. They probably just think it’s a research station, not realising there’s the opportunity to come and set up a business here.... Try and attract more farms on to the site, or nearby. That would be good for their consultancy, and also for their commercial position – more chance for that. (OceanZ)

It should be noted that NIWA established Natural Solutions Ltd to identify novel products and explore opportunities for commercialisation.

**Thinking about the Future**

Continuing to develop the research activity at the BBAP was a more likely development scenario than building a large production facility. Certainly, access to research services in an informal setting was a key feature of the site to date. The key challenge as the BBAP develops will be to maintain informal relationships and open communication channels with companies on site, while at the same time fulfilling commercial obligations for service provision to their clients.

This case study highlighted two different types of relationships that NIWA had with companies on site. Different configurations of engagement and relationships with new companies may emerge in the future. When new companies express an interest to move on site, NIWA should also consider the potential new entrant’s ability to maximise the opportunities for informal engagement, take advantage of the research services, and benefit from co-location with NIWA and other companies. Of critical importance was NIWA’s ability to continue to demonstrate trustworthiness as a reliable and effective partner.