Namibia's oyster farms are poised for massive growth

Namibia's oyster farming industry is looking to new markets in the Far East and gearing up for substantial growth, but a lack of key services still threatens to limit the industry's ambitions. Claire Attwood was there to investigate.

Oyster farming is the most established aquaculture activity in Namibia with six farms currently in operation at Walvis Bay, Swakopmund and Lüderitz. Both Pacific oysters (*Crassostrea gigas*) and European oysters (*Ostrea edulis*) are grown.

The estimated production of the Namibian oyster industry in 2004 was six million oysters, worth approximately N$12 million (R12M). Some farmers are experimenting with alternative species such as scallops (*Argopecten purpuratus*) and one operation in Walvis Bay is harvesting wild clams, *Venerupis corrugatus*, and fattening them for the export market. Over 70% of Namibian oysters are exported to South Africa.

Ideal conditions

There are a number of factors that make Namibia an ideal location for oyster farms. For a start, the nutrient-rich waters of the Benguela Current encourage rapid growth. Oysters grow to market size in eight or nine months in Namibia, in contrast with Europe where they are typically cultivated for 24 months. Namibia also has the added benefit of clean water; no rivers empty into the sea along the desert coast, dramatically reducing the potential for contamination from land-based pollution.

Oysters are filter feeders that ingest particulate matter in the seawater around them. In-so-doing, they concentrate bacteria, viruses and other potentially dangerous biological contaminants in their tissues. Therefore, from a consumer safety perspective, it is absolutely vital that the water they are cultivated in is free of harmful contaminants.

70% of Namibian oysters exported to South Africa

Substantial growth

Spurred on by the advantage of clean, phytoplankton-rich water and strong demand from emerging markets, Namibia's oyster farmers are preparing for substantial growth.

The Aquapark at Walvis Bay, which is reserved by Namibia's port authority, Namport, for aquaculture activities, was recently expanded from 500 to 1 250 hectares of sea space.

The park is situated between three and four nautical miles from the quays of the fishing companies that dominate the northern fringe of the harbour. It is protected from the prevailing south westerly swell by the sand spit of Pelican Point.

■ **Far left: A worker at Richwater Oyster Production, near Swakopmund, prepares fresh oysters for market. Over 70 percent of Namibian oysters are sold in South Africa, but this is likely to change, with important markets opening up in the Far East.**

■ **Left: Oysters are cultivated on wooden runways. The nutrient rich water flows over the oysters which grow rapidly. They reach market size in eight to nine months, as opposed to the average grow-out time of 24 months in other parts of the world.**

Three farms are currently utilising the Aquapark for the cultivation of oysters. Two farms use the longline system for cultivating oysters, while a third farm uses the traditional Spanish raft method.

The longline system is a very simple method of culture. Horizontal lines are strung across the water and kept afloat by large plastic drums. Racks of oysters are then suspended from the horizontal lines. Each rack holds about 1 000 medium-sized oysters.

With the raft system, bags and racks of oysters are suspended from the wooden beams of a sturdy raft. The floating raft is anchored to the seabed.

Both of the farms that utilise the longline system of culture are preparing to dramatically increase the number of lines available for oyster culture.

James West of Namibia Aquaculture (Namaqua) and chairman of the Namibian Mariculture Association is planning to increase the production of Namaqua's farm to a million oysters per month. "We have a well established production system," says West, so expanding our production will simply mean doing more of the same."

Henning du Plessis of Joe's Oysters is establishing 300 longlines in the Aquapark with the same goal of producing a million oysters per month.

Gregory Swartz who produces oysters at the extensive Walvis Bay Salt Refiners is also gearing up to produce larger quantities of oysters: "We produce a million oysters per year and we're looking at expanding and producing a million-and-a-half," he says.

Market demand

The industry's collective plans to expand oyster production are being driven by strong demand from markets in the Far East. Namaqua already sells oysters into Beijing, and West is encouraged by avid demand for Namibian oysters from the Chinese market.

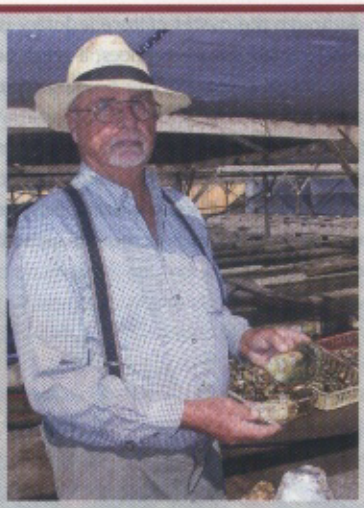
"In China you have a huge developing economy, a huge population and people moving into an income bracket where they can afford to eat oysters," explains West, "The market is there."

Technical challenges

However, there is one major hurdle that the industry must overcome before it is able to capitalise on this emerging market – Namibia currently lacks the industrial laboratories it needs to carry out mandatory tests that certify its oysters are uncontaminated and safe for human consumption.

Continued on page 10

Still growing oysters after all these years



Namibian aquaculture pioneer, Jürgen Klein, began experimenting with oyster farming in 1987. Today his simple and compact oyster farm, which is incorporated into the extensive Mile Four Salt Pans outside Swakopmund, is still producing around 500 000 market-sized oysters per year.

At the Mile Four Salt Pans, fresh seawater is pumped into a series of huge evaporation ponds. Oysters are grown in the first pond where the concentration of salts is much lower than in successive ponds.

The oysters are cultivated in mesh bags that are suspended from floating lines, as well as in wooden racks that are submerged in the water between salt pans one and two.

Both Pacific oysters and European oysters are cultivated. Pacific oysters are cultivated from imported spat – Klein imports 200 000 spat at a time - but European oysters are cultivated from spat raised in a separate culture facility at the Salt Pans.

"The environment is very conducive for producing spat," says Klein who does not culture feed for the spat, but uses only plankton rich seawater to rear the juvenile shellfish.

Oysters are sorted periodically and then harvested and graded. They are all exported to Johannesburg where there is a strong demand for oysters from the restaurant trade.

A true entrepreneur, Klein has experimented with growing clams, tilapia (freshwater bream) and even *Gracilaria* - a red seaweed that is used extensively in the pharmaceutical industry - in his salt pans. However, the exceptional birdlife that is attracted to the pans put paid to his best intentions:

"We found there is a certain species of snipe that is very fond of clams," jokes Klein.

Other water birds used the *Gracilaria* as nesting material and the tilapia were quickly devoured by seabirds.

The birds do pay for their excesses, however; Klein harvests guano (a powerful organic fertiliser) from the guano platforms he constructed near the salt pans.

■ **Manuel Romero of Beira Aquaculture uses the traditional Spanish raft system for growing oysters. The rafts are anchored to the seabed and bags or baskets of oysters are suspended from the cross beams.**

Although the oyster culture industry is understandably frustrated by the lack of laboratory services, a great deal of progress has been made in the last two years. With funding from the Benguela Current Large Marine Ecosystem (BCLME) Programme and assistance from a team of international scientists, the National Marine Information and Research Centre (NatMIRC) has succeeded in introducing a shellfish sanitation programme modeled on the food safety regimes of other shellfish producing nations such as the European Union (EU), New Zealand and the United States.

Water quality in Walvis Bay's Aquapark is tested once every two weeks and similar tests are conducted in Lüderitz. Oysters are tested for bacterial contamination and heavy metals, but NatMIRC still lacks the equipment to carry out routine tests for biotoxins. As a result, Namibian oyster producers are still reliant on South African laboratories to conduct biotoxin tests. (Biotoxins can accumulate in the tissues of oysters when a toxic red tide or phytoplankton bloom is present in the water.)

"We've been trying for five years to get a laboratory in place," says West, "we're still relying on Cape Town and it's not satisfactory. We need a one day turnaround time."

Test results can take up to three weeks to be returned from Cape Town and the lack of local laboratories inhibits Namibia's ability to meet the food safety requirements of potential trading partners, such as the EU. "I definitely feel that this relatively small issue is preventing some massive development," says West.

Government assistance at hand

Bronwen Currie, chief biologist at NatMIRC's aquaculture directorate, is well aware of the oyster producers' frustrations, but she is encouraged by the fact that Namibia's Ministry of Trade and Industry and the Ministry of Fisheries and Marine Resources have jointly earmarked funds for the construction of the required laboratories.

Presently microbiology and phytoplankton laboratories dedicated to aquaculture are being set up at NatMIRC, whilst the Ministry of Trade and Industry and The Ministry of Fisheries and Marine Resources will jointly fund biotoxin laboratories.

"This is a huge step forward because the Ministry of Trade and Industry, as the competent authority, has realised how serious the situation is and has prioritised these laboratories," she says.

Currie has no doubt that the industry will get the laboratories it needs, but she concedes that constructing and equipping of the labs will take time.

In the meantime, the oyster producers are investigating a number of stop-gap measures which would allow the industry to meet the food safety requirements of its trading partners.

No evidence of biotoxins

Ironically, after two years of monitoring, NatMIRC scientists have found no evidence of biotoxins in Namibian oysters. Even though the waters of Namibia are extremely rich in phytoplankton, regular tests have so far proved negative for biotoxins that could cause poisoning syndromes in consumers. Aspecies such as Alexandrium catenella, could cause paralytic shellfish poisoning PSP, whilst some species of Dinophysis and Pseudo-nitzschia can cause diarrhetic shellfish poisoning DSP and amnesic shellfish poisoning ASP respectively.

"We don't think that biotoxins are a problem here, even though we've got the species," says Currie.

The scientist's tests have verified the fact that the water off Namibia is exceptionally well suited to the cultivation of oysters. Regular testing of water quality in the Aquapark, coupled with tests on cultivated oysters, have all proved negative for dangerous bacteria, heavy metals and phytoplankton toxins.

"This is very good news for the industry," says Currie.

■ Above left: A crop of oysters is taken by boat to a land based processing facility where they are cleaned and prepared for market.

■ Left: Namibian oysters are said to be the best in the world.

Sulphur eruptions could hamper diversification

Eruptions of hydrogen sulphide from the seabed are a common occurrence off Swakopmund and Walvis Bay. The eruptions are a natural phenomenon that turn seawater a milky turquoise colour and cause an unpleasant "rotten egg" smell to hang over the two coastal towns, usually for a period of a few days.

On a recent visit to Walvis Bay, I observed a very severe sulphide event and experienced first hand how these events have the capacity to restrict the growth of Namibia's aquaculture industry.

I accompanied Bronwen Currie, senior biologist at NATMIRC's aquaculture directorate on an excursion to Walvis Bay's Aquapark. We visited Beira Aquaculture's oyster farm which is owned and managed by Manuel Romero.

Traditional methods

Unlike his counterparts in the oyster culture industry in Namibia, Romero uses the traditional Spanish raft method for culturing oysters. Five very robust floating rafts, consisting of sturdy vertical and horizontal posts, are anchored to the seabed about four nautical miles from Walvis Bay harbour. Baskets or bags of oysters are suspended from the horizontal posts, at a depth of about one metre.

The oysters are grown from spat produced at Romero's land-based hatchery, as well as imported spat from Chile. Romero is also experimenting with the culture of clams and scallops. He imports scallop spat and harvests clams in Walvis Bay which he fattens in suspended bags.

On the day that we visited Romero's rafts, a very strong smell of sulphur hung over the harbour area. Currie's water quality tests showed hydrogen sulphide throughout the water column with zero levels of dissolved oxygen, even in the upper layers of the water. She explained that sulphide eruptions typically strip dissolved oxygen from the water column.

Oysters can usually survive the eruptions because they close up and may stay closed until the event is over, but less robust species, like scallops die. "These oysters are basically holding their breath," noted Currie.

Romero harvested his entire crop of scallops during the sulphur eruption, hauling them out of the sea as soon as they started to show signs of stress as a result of the low oxygen levels in the water. Fortunately, the sulphur in the water does not affect the scallops' meat and so it was possible to freeze the harvest for future consumption.

Sulphur eruptions on the increase

The sulphur eruptions that occur off Namibia are a natural phenomenon, but a perceived increase in their frequency has been linked to the collapse of the sardine stock.

The eruptions typically occur along the central Namibian coast, north of Lüderitz - the most intense upwelling centre in the world – where perennial strong winds move surface water offshore, to be replaced with nutrient rich water from the deep ocean.

This natural process of fertilisation causes vigorous phytoplankton growth. But, say scientists, without massive shoals of phytoplankton-consuming sardines to utilise the phytoplankton biomass, the excess sinks to the ocean floor where it decomposes.

The accumulation of organic matter on the sea floor results in extensive areas where dissolved oxygen concentrations are very low or entirely lacking. Methane (CH) gas and poisonous hydrogen sulphide gas (HS) are produced within a metres-deep layer of anoxic diatom sludge. Under immense pressure, methane effervesces into tiny gaseous bubbles which become sufficiently buoyant to move upward.

The bubbles expand rapidly as they rise, because hydrostatic pressure decreases exponentially along their upward journey, causing them to rise faster. The accelerated upward movement of bubble-infused waters would induce an additional lowering of hydrostatic pressure in the surrounding water, causing a spreading of effervescence and bubble expansion. This explains why sulphur eruptions can occur over a massive area, sometimes up to 20 000km of ocean surface - an area about two thirds of the size of Belgium!

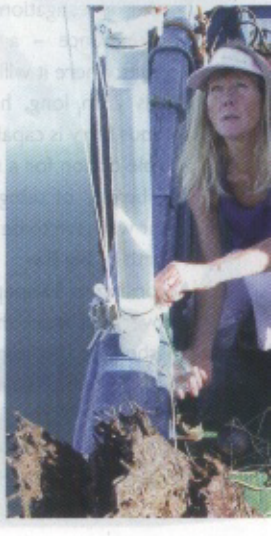
HS is highly toxic to marine organisms and also has the effect of stripping dissolved oxygen from the water column. This was evident at the Aquapark in June where the exposed tiny invertebrates like shrimps, starfish and brittle stars that colonise the oyster bags and baskets were mostly dead or dying. "This is a localized but intense sulphur eruption – the worst the farmers of Walvis Bay have experienced in the past four years," said Currie.

Devastating consequences

Unfortunately for Romero and his counterparts in Walvis Bay, the sulphur eruption that I witnessed took a whole week to dissipate. "It really took it's toll," said Currie, who reported that one farmer lost 70 percent of his oyster crop, while Romero also lost substantial numbers of oysters.

The effect of the event on scallops may curb Romero's ambitions to diversify his culture species. "It shows that every part of the world has its challenges," said Currie, "while we appear not to suffer from polluted waters, or even – as yet – toxic phytoplankton blooms, these naturally occurring sulphide eruptions are at present the major challenge to the farmers."

By Claire Attwood



Right: Manuel Romero checks to see whether the intense sulphur eruption that occurred of Walvis Bay in June has affected his crop of oysters.

Far right: Bronwen Currie, chief biologist at NatMIRC's aquaculture directorate, tests the water in the Walvis Bay Aquapark. She found that the sulphur eruption that occurred in June stripped the water of dissolved oxygen.