

Taking a closer look at the Angola Benguela Front

Scientists from Angola, Namibia and South Africa met in Swakopmund recently to share knowledge about the Angola Benguela Front, one of the most productive regions of the Benguela Current Large Marine Ecosystem (BCLME). **Claire Attwood** reports.

The workshop, which was sponsored by the BCLME Programme, focused on the physics, chemistry and biology of the frontal zone where the cold, northward flowing Benguela Current meets the subtropical, southward flowing Angola Current. This usually occurs at between 14 and 16°S, in the region of the Kunene River which separates Angola and Namibia.

The transboundary region is of great importance to both countries. It has rich fisheries including pilchard, horse mackerel, anchovy, sea bream, sardinella, deep water crab, tuna and hake, all of which are exploited commercially.

The fisheries are influenced by the mixing of the two currents and oceanographers and biologists from all three countries are working together to better understand the dynamics of the Angola Benguela Frontal zone.

Benguela Niños,

Most of the oceanographic work that has been undertaken in the frontal zone has focused on Benguela Niños, sustained warming events that are characterised by large swathes of warm, highly saline water moving into northern and central Namibia from Angola.

The events occur roughly every ten years and oceanographers have been watching closely to see whether the warm event that was documented off Namibia between January and March 2006 develops into a fully fledged Benguela Niño.

Climate records show that, in the northern Benguela, wind speeds were unusually low between January and March this year and sea surface temperatures off Namibia were unusually high. Namibia also received extremely good rains during the summer months, a phenomenon that is typical of Benguela Niño years.

Oceanographers' understanding of Benguela Niño has grown considerably since 1995 when a massive intrusion of warm water was documented in northern Namibia.

The Benguela Niño of that year was preceded by an invasion of low oxygen water over much of the shelf. The two extreme environmental events had a dramatic impact on the northern Benguela ecosystem and serious repercussions for the fishing industry. An estimated two billion juvenile hakes were killed by low oxygen water in the inshore

nursery grounds and over 300 000 seals died of starvation. The breeding cycles of marine birds such as cormorants and penguins were also severely disrupted.

Towards an early warning system

One of the objectives of the Angola Benguela Front Workshop was to plan research activities that will eventually help scientists to predict the occurrence of extreme environmental events, such as Benguela Niño, in the frontal zone. The scientists are working together to establish an "early warning system" that will alert managers and decision-makers before a major oceanographic event takes place.

Key components of the early warning system are an Atlas buoy that is soon to be deployed off Angola and several tide gauges that will be set up at a number of locations along the coast of South Africa, Namibia and Angola.

The Atlas buoy and tide gauges have been purchased by the BCLME Programme to enhance oceanographic and meteorological observations with the ultimate goal of improving the predictability of unusual environmental events in the Benguela region.

■ Above: The Workshop was officially opened by Kilus Nguvauva, the deputy minister of Namibia's Ministry of Fisheries and Marine Resources (centre). He is pictured with Francisca Delgado, director general of Angola's fisheries institute, INIP, Dr Neville Sweijd, Dr Moses Maurihungirire, director of the BCLME Programme's Swakopmund office and Dr Mick O'Toole, chief technical advisor of the BCLME Programme.

■ Below: Dr Neville Sweijd, director of the BENEFIT Programme, outlines the objectives of the Angola Benguela Front workshop.



THE SPECTRE OF CLIMATE CHANGE

Climate change is a subject that is beginning to receive increased attention among scholars of the Benguela. Environmental monitoring in Angola, Namibia and South Africa, coupled with recent outputs from the BCLME Programme, provide a growing body of evidence which shows that significant changes have taken place in the Benguela ecosystem over the past half century.

Environmental parameters such as sea surface temperature have shown a pronounced warming trend in the northern Benguela, a cooling inshore in the south, and warming offshore near the southern boundary of the BCLME.

There has been an increased frequency of warm events, including Benguela Niños in the northern Benguela and the occurrence of low oxygen water and sulphur eruptions have been more frequent off Namibia, with severe implications for fisheries resources.

Scientists are beginning to talk about a "regime shift" in the Benguela and are tentatively suggesting that the changes that have been observed in the Benguela could be associated with global climate change. They also suggest that climate change may be behind the eastward movement of pilchards and other species.

The eastward movement of pilchards has been well documented. Senior specialist scientist at Marine and Coastal Management, Carl van der Lingen confirmed in April that catches of pilchards taken off Mossel Bay have leapt up from 2110 tons to 121 536 tons in five years.

Other species have also shown an eastward movement. Most notable has been the shift of west coast rock lobster from the traditional fishing grounds on the west coast to the southeast coast.

Seabird biologists have also documented changes in the breeding patterns of several seabirds. For instance, populations of Cape gannet *Morus capensis* appear to have followed the sardine shoals eastwards. In 1956, only seven percent of southern Africa's gannet population occurred in the Eastern Cape. This number has jumped to 67%, while the number of gannets breeding on Namibia's offshore islands has plummeted.

Other seabirds that have moved their breeding localities eastward are the endemic crowned cormorant *Phalacrocorax coronatus*, which now breeds at Tsitsikamma National Park, 355km east of its traditional nesting sites. Similarly, the Hartlaub's gull *Larus hartlaubii* has established two breeding colonies in the vicinity of Port Elizabeth; it is breeding 550km further east than it did 10 years ago.

If recent oceanographic and ecosystem studies are correct, an eastward and poleward shift in the Benguela ecosystem may be taking place. The shift might explain the changes that fishermen are reporting from the fishing grounds and the dramatic changes in seabird distribution. It could also signal serious consequences for the Benguela, an ecosystem that has, until recently, sustained large scale fisheries.

Most important for South Africa and Namibia are the hake, sardine, horse mackerel and rock lobster fisheries which support thousands of jobs and earn valuable foreign currency. Large scale environmental change has the potential to cripple these industries, with devastating effects on national economies.

