A snap-shot of the oceanography along the Maputaland shelf edge — habitat of the coelacanth (*Latimeria chalumnae*)

Tamaryn Morris
ECO Tech

tmorris@deat.gov.za

"A living organism is the result of past evolutionary events and survives under present environmental forces only if these forces are similar to forces of the past"
Helfman, *et al*. 1997
(Cited by Fricke and Hissman, 2000)

Introduction

Coelacanths were discovered by Trimix SCUBA divers at 104 m in Jesser Canyon, off the Sodwana Bay coastline in October 2000. This was heralded as a monumental discovery for marine science in South Africa as well as the SCUBA diving fraternity, as coelacanths have never before been viewed in this manner worldwide. The African Coelacanth and Ecosystem Programme (ACEP), managed from the South African Institute for Aquatic Biodiversity (SAIAB) in Grahamstown now heads up a regional, multi-disciplinary programme. The oceanographic component is based at Marine and Coastal Management (MCM), in Cape Town. Aside from producing cutting edge science in oceanography and marine biology, emphasis is also placed on developing partnerships with neighbouring countries bordering the Mozambique Channel in line with the objectives of NEPAD. My primary objective within the programme is to facilitate the planning and execution of all the cruises. This involves organizing the scientific plans, sailing orders, scientists and ship matters.

I completed my National Diploma in Oceanography at the Cape Technikon in 2001. In 2002 and 2003 I did my B-Tech in Oceanography also at the Cape Technikon and as part of the course, we had to do an Honours style thesis. I chose to do the oceanography of the Sodwana Bay region in Northern Kwz-Zulu Natal, in order to understand the habitat in which the South African population of coelacanths survives, and also to compare this region to other regions where coelacanths have previously been found, primarily the Comoros Islands.

The Study

The Fricke – Group from the Max Planck Institute in Germany brought their two-man submersible, *Jago*, to South Africa and joined our April Cruises in 2002 and 2003 to study the coelacanth in their natural habitat as well as do a population estimate for Sodwana Bay. Oceanographic work planned for these trips was compromised due to the operations of this submersible, never the less some work was completed, but can only be presented as an initial study, hence the terminology "snap-shot" in the title of this paper. Further dedicated studies need to be completed on future cruises in order to give a more definite description of the Maputaland shelf edge oceanography.

A number of CTD lines were completed and data was used from primarily three of these lines, namely, Leven Point, 9-Mile Reef and Ponto da Ouro on the border of Mozambique and South Africa. Four cruises were completed during the study, two in Sodwana Bay with a specific focus on *Jago* operations and two into the Mozambique

Channel, which aimed at forming collaborations with scientists and training students from the countries bordering the Mozambique Channel.

The fundamental parameters investigated in this study were temperature and dissolved oxygen, using a CTD (Conductivity, Temperature and Depth) instrument and current meter data using a ship-borne Ocean Surveyor ADCP (Acoustic Doppler Current Profiler) mounted on the hull of the vessel. Coelacanths are found between 100 and 130 m in Sodwana Bay. In the Comoros Islands the animals are found considerably deeper at between 200 and 300 m, and only one sighting in Indonesia was recorded at 155 m. Initial results show that the temperatures at Sodwana Bay are approximately 3˚C warmer than those experienced in the Comoros Islands and only 2˚C warmer than Indonesia. Dissolved oxygen values are also marginally different, Sodwana Bay having values on average of 0.5 ml l^{-1} less than in the Comoros Islands which experienced 3.5 ml l^{-1}. No dissolved oxygen values were recorded in Indonesia.

Current strength was by far the most interesting parameter, yielding values in Sodwana Bay previously thought unacceptable to coelacanth physiology. The Comoros Islands experiences “gentle” currents with values of between 4.9 and 3.1 cm s^{-1} measured between 159 and 273 m by a moored ADCP. Values measured by the ship-borne ADCP yielded values of between 20 cm s^{-1} in the north and 80 cm s^{-1} in the south of Sodwana Bay, at a depth of 100 m. Currents were not measured accurately in Indonesia but the submersible pilot estimated very strong currents in the area of about 200 cm s^{-1}. The key questions arising from this initial study is how do coelacanths survive in strong Western Boundary Currents like the Agulhas Current and can they move against this current towards the Mozambique Channel and eventually the Comoros Islands?

Future Work

Veronica Fernando Dove from Mozambique will extend this initial study into Mozambique waters up to the Inhambane Terrace, beginning her Masters thesis in the process. There may exist a cyclonic gyre in this region, which will affect the oceanography of the regional extensively and thus the habitat these coelacanths reside in. This work will begin on our next cruise in April / May 2004.

I will continue along the M-Tech route and perform a desktop study of the oceanography in Indonesia, in order to understand the habitat of the Indonesian coelacanths. Only two animals have been fished out accidentally and a further two were sighted by the *Jago*, indicating a small population. These animals are unique as they are a different species, *Latimeria menadoensis.* These data will be compared to Sodwana Bay and the Comoros Islands. This information will be collated into a formal M-Tech thesis.