

Unlocking the mystery of the MASCARENE PLATEAU

Dave Robins explains how understanding plankton is vital for the sustainable development and conservation of the shallow sea between the Seychelles and Mauritius.

We are all familiar with the quote that we know more about the surface of the moon than our own oceans, but people often assume that means the deep ocean and sea floor. In fact some almost or completely unexplored parts of the oceans are so shallow you can paddle in them.

What is the Mascarene Plateau?

The Mascarene Plateau resulted from the volcanic activity of the Reunion hot spot between 20 and 40 million years ago. The 2,200km crescent-shaped ridge runs roughly north-south from the Seychelles Bank to the island of Mauritius. The Seychelles Bank, with its low-lying coral islands, is not volcanic, but granitic, and probably a remnant of continental crust from the break-up of Gondwanaland, as the African and Asian continents separated. The ridge's islands, banks and shoals form a barrier modifying the predominantly westward passage of the South Equatorial Current and waves across the Indian Ocean. The ridge shallows to less than 30m in many areas of the banks at the north of the plateau,

and places where the depth of the plateau is less than 200m can be more than 250km wide. The Mascarene Plateau is a rare example of an extensive shallow-shelf sea completely detached from land boundaries, and is a large, almost completely unexplored, marine ecosystem.

To find out more about it the Royal Geographical Society (with the Institute of British Geographers) and Royal Society set up *The Shoals of Capricorn* marine programme. The purpose of the research, coupled with education and training, was to help with sustainable development and conservation of the marine and coastal environments of the Seychelles and Mauritius. A second aim was to develop a better picture of how the Mascarene ridge affects water flows and ecological processes in a key global ocean-climate system – the western Indian Ocean.

In April 2000 the UK (DEFRA) Darwin Initiative funded a joint training and research programme between local agencies, *The Shoals of Capricorn* programme and Plymouth Marine Laboratory with the Marine Biological

Association. The programme, called *Biodiversity in the basement of the marine food web*, focuses on the region's plankton. Zooplankton are the very small, often microscopic, animals that drift in the world's oceans. Many are early life stages of larger more familiar marine life. Zooplankton play a key role in the movement of carbon in the oceans. They absorb carbon into their bodies and when they die, their corpses sink into deeper waters and sediment, locking up the carbon. Zooplankton also play a key role in the food web and are important food sources for larval stages of many commercial fish.

One of the project's primary objectives was, for the first time, to identify important zooplankton species around the Seychelles and Mauritius and start local training and research programmes to monitor plankton diversity and abundance. To do this we needed to transfer our expertise in, and knowledge of, the plankton biodiversity, developed through NERC research programmes, to local people and agencies.

HRH Prince Michael of Kent visiting the Seychellois team in their lab.



Sabrina Meunier conducting test analysis of zooplankton at the end of training on Rodrigues. The high powered microscopes with video attachments allow detailed analysis of zooplankton and capturing of images for manuals.



The region's economy depends on the quality of the marine environment. Both Mauritius and the Seychelles need to be able to identify and monitor the coastal marine wildlife which are sensitive to change. They also need to understand the plankton's role in sustaining living resources, such as fish, that are so critical to local economies. If we can use research to understand the zooplankton's abundance and community structures across the Mascarene Plateau, it would improve our understanding of the ecosystems in the region as a whole. The Seychelles and Mauritius are contrasting environments. Climate change and harvesting issues already do, or soon will, affect their seas. The Seychelles is warm, equatorial in nature, and up to 80% of its coral has been affected by recent bleaching, impacting on biodiversity and the functioning of the ecosystem. It has marine nature reserves and so we need to work out the key planktonic processes involved in recruitment of species into the reef systems. Mauritius and its off lying island of Rodrigues, on the other hand, are less affected by coral bleaching, but do have important fisheries, as well as pressures on their coastal environment from industry and tourism. This region is also sensitive to climate change – both from warming and from changing sea level.

Royal interest

When *The Shoals of Capricorn* field programme formally came to an end in November 2001, its patron, HRH Prince Michael of Kent, visited the region to hand over the *Shoals* bases to the host nations. In the Seychelles this is undertaken by the new Seychelles Centre for Marine Research & Technology

(SCMRT) under the Ministry of Environment, and in Rodrigues through a new non-governmental organisation, Shoals Rodrigues, associated with the Mauritius Oceanography Institute (MOI). Prince Michael spent time with the Seychellois team who collect and analyse the plankton throughout the year. During the Darwin project's first field visit to Rodrigues in 2000, the UK team arrived to find Prince William spending a month working at the Rodrigues *Shoals* base. During their ten days' overlap Prince William helped collect and look at the plankton from around the island.

New species found

Since the work began in 2000, both the Seychelles and Rodrigues teams have sampled zooplankton almost every week. This has produced two years of data for a region that had almost none before. Their new findings include a new species of copepod, soon to be described in the *Journal of Marine Biological Association*. The data is starting to provide the region with a solid platform on which to build for both the long-term understanding of the coastal marine system and its response to global change and local stresses.

Our understanding will continue to grow as other research goes on. This year Southampton Oceanography Centre (SOC) ran a research cruise onboard RRS *Charles Darwin* along each side of the plateau. One of PML's Darwin team went

too, to tie the SOC cruise data into the sampling and results from a locally run research cruise between the Seychelles and Mauritius in 2001.

The Darwin project ends in 2003 with a workshop in the Seychelles to consolidate the three years of research and training, as well as to help map out strategies for each regional team. The workshop will also launch the guide to zooplankton in the western Indian Ocean. It will also review technology to support research and long-term monitoring in the region, such as satellite remote sensing.

Next time you are paddling in the sea in exotic climes you may be closer than you think to a new discovery, and will it be the application of NERC science that unlocks the secret?

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