

**SOUTH PACIFIC COMMISSION
TWENTY-THIRD MEETING OF THE COMMITTEE OF REPRESENTATIVES
OF GOVERNMENTS AND ADMINISTRATIONS**

(Nouméa, New Caledonia, 19-22nd October, 1995)

SPC MARINE RESOURCES SINKS AND SOURCES PROJECT

Introduction

1. At the recent SPC workshop on the management of coastal fisheries it was brought to the attention of Pacific Island fisheries managers that long-range larval dispersal probably plays a much larger part than previously envisaged in the maintenance and rehabilitation of coral reef ecosystems. As a result of recent work in Australia it appears that reefs that have been badly damaged, say by cyclones, or crown of thorns starfish infestation, can recover completely within the space of a decade, but only if there is a source of larvae from a healthy reef upstream on the ocean current. It was suggested that Western Australian reefs, because of the currents in the area, are almost totally dependent on Indonesian reefs for replenishment. The Great Barrier Reef, on the other hand, is capable of self-replenishment to a certain extent.

2. One of the recommendations of this workshop was that the importance of "sources" and "sinks" of larvae of coral reef-dwelling organisms ought to be assessed, and this has obvious regional implications. If, for example, ocean currents are such that one country (sink, A) derives a great deal of its larval replenishment from another country (source, B), then country A is dependent on country B to maintain either the health of its reefs, or to maintain some effective marine reserves. Equally, country B may well be dependent on the goodwill of country C.

3. Clearly, it is desirable to determine to what extent each SPC member relies upon another for the maintenance of its reefs. This project would develop a better idea of sources and sinks of larvae, and of the longevity and circulation of different types of larvae, and make an assessment of the overall importance of this phenomenon to regional fisheries and conservation.

4. This purpose of this paper is to seek the approval of CRGA to pursue funding for the project outlined in the following paragraphs.

Project Description

5. The proposed project would investigate the long- and short-range transport of larvae of coral reef-dwelling species over a three year time-frame. Given the predominantly westerly set of the ocean currents in the tropical south Pacific this project would identify larval sources in French Polynesia and their likely significance in the replenishment of "sink" reefs to the west, in Cook Islands and Samoa, and islands further west.

6. Fortuitously, the resumption of nuclear bomb testing by the Government of France in French Polynesia, will provide an easy means of identifying the source of larvae, by "tagging" with radio-isotopes in the vicinity of Mururoa. The long time-period since the previous tests will enable radio-isotope tags to be unambiguously verified and will enable larval drifts to be timed, as well as sourced, from Mururoa.

7. Rates of larval drift would be calibrated against the drift of heavy metal isotopes, as picked up and concentrated in the kidneys of resident populations of the giant clam *Tridacna maxima* in downstream island groups.

8. Additional benefits from working at this location would be the accurate measurement of the growth rates of many reef-fish and molluscs, as well as the accretion rate of reef-building corals, based on the radio-active marking of shells and fish hard-parts at the time of the explosion.

Resources Required

9. It is envisaged that the project aims could be fulfilled by the application of three scientific staff (Biologist, Chemist and Oceanographer) and two technical support staff over a period of three years. The project would require the use of a sea-going vessel for open-water plankton surveys and would preferably be based at Mururoa, French Polynesia, with field trips to potential "sink" reefs at varying distances from the source of radio-isotope markers.

10. The total funding required would be approximately 1,500,000 CFP Units, plus contingency security equipment. It is envisaged that laboratory space, living quarters and vessel time would be rented from the French Government at Mururoa.

Conditions for success of project

11. If the project is to succeed in tracking radio-isotope tagged larval movements across eastern Polynesia there must be noticeable leakage of radio-isotopes into shallow water from Mururoa atoll following nuclear bomb tests. If this does not occur then the project will be unable to fulfil its goal within the time available. It would instead have to be carried out over a longer time-period, without the benefit of radio-isotope tagging, and could equally well be carried out at another site in the South Pacific.

12. As a precursor to the full project, it would be advisable to run a series of tests first to determine whether or not the primary requirement of radio-isotope dispersal is fulfilled. If radio-isotopes are reliably detected in giant clam kidneys, by comparison with distant populations, there would be every hope for success of the full project. But if giant clams at Mururoa do not accumulate the heavier radio-isotopes in their kidneys, there would probably be little chance of success in detecting radio-isotopes in larvae further downstream of the site. The project would therefore have to pursue a different strategy and develop larval sourcing methods which do not rely on the "short-cut" of radio-isotope tagging.