

2.0 OBJECTIVES

The overall aim of the study was:

To determine if the number and size of commercially important invertebrates (e.g. trochus, sea cucumbers and giant clams) increases as the result of the declaration of the Arnavon Islands Marine Conservation Area (MCA) relative to fished areas.

As discussed more fully in Section 3.1, marine reserves are seen as a means of conserving biodiversity and stocks of commercially important fish and invertebrates in the oceans. They may also help to enhance stocks outside reserves, for example by sheltering reproductive populations from depletion, which may then help to "seed" other areas. The use of marine reserves in tropical ecosystems may be particularly important as many species occur together on coral reefs and they can be reduced dramatically, and simultaneously, by overfishing, much of which is based on multispecies fisheries.

Marine reserves may also influence the sizes of individuals and, therefore, reproductive output. Commercial harvesting of species frequently causes a decrease in the mean size of individuals, since large animals are usually targeted. Release of fishing pressure via the creation of a marine reserve could affect sizes in two ways. Sizes may increase due to the release of fishing pressure on larger size classes, or sizes may decrease if there is substantial recruitment of juvenile animals into the population.

Unfortunately, many of the scientific investigations of the effectiveness of marine reserves have been sub-optimal in one or two ways. First, they often do not have data from the marine reserve prior to its declaration and, second, they often lack comparisons with non-protected areas. Both these sources of information are essential for providing an unambiguous test of the effectiveness of a marine reserve. The declaration of the MCA, in conjunction with the design of an effective monitoring program, provided the opportunity to rigorously test some of the claims made for marine reserves. Such information is needed to empower local communities to make informed decisions about the value of fishing closures, and for the general management of marine reserves.

In achieving the aim of the study, several specific objectives had to be met. These were:

- A pilot investigation initiated to select sampling sites and develop appropriate sampling procedures.
- Estimation of the abundance and size of commercially important invertebrates at the Arnavon Islands, and at several reference areas, on three occasions prior to the declaration of the MCA.
- Annual surveys of the abundance and size of commercially important invertebrates, within the MCA and reference areas, including liaison with local communities.
- Estimation of the abundance and size of commercially important invertebrates on three occasions, three years after declaration of the MCA, to provide a formal test of the effectiveness of the MCA.
- Use of current best practice in experimental design and statistical analysis to provide a rigorous and objective test of the effectiveness of the MCA.

All of these objectives were achieved successfully. It should be noted that the objective to conduct annual surveys was not part of the original project description. These surveys were added to the study following the pilot investigation as a means of obtaining interim data on the MCA. They were also very important in maintaining the interest of national scientists and conservation officers, and local communities, in the project.