

## ■ MARINE RESOURCE SURVEY AND ASSESSMENT OF JALUIT ATOLL, REPUBLIC OF THE MARSHALL ISLANDS

### Background

The Jaluit Atoll Marine Conservation Area (JAMCA) was established in 1999, after preliminary studies in 1998. The JAMCA was developed through the combined efforts of the Jaluit Atoll Development Association, the Jaluit Atoll Local Government Council, the Jaluit Community and the national Environment Protection Authority (EPA). Donor support and assistance was received from the South Pacific Regional Environment Programme (SPREP) through its South Pacific Biodiversity Conservation Programme (SPBCP); a Conservation Area Supporting Officer (CASO) has recently been appointed to manage and develop the program. This position is based on Jaluit Atoll.

The goals of the JAMCA are to develop and implement:

- a sustainable marine resource management plan,
- a sustainable terrestrial management plan,
- community-based management structures,
- alternative income generating activities,
- public awareness, training and education programs, and
- measures to strengthen the capacity of the community to effectively manage a conservation area.

The JAMCA project will first develop an adaptive marine resource management program that has access to reliable, baseline biological information on the marine ecosystem and

species-specific population data. This information will provide the basis for the formulation of a robust monitoring program and a resource management plan. The goal of this marine evaluation report is to provide baseline biological information. The marine resource management program must monitor changes in resource levels and be able to respond decisively with management decisions that are practical and acceptable to all stakeholders and resource users. The marine resource survey objectives were to:

- assess and estimate species stocks for the below listed selected species as baselines for planning and future monitoring,

- map the general distribution of populations (or major population clusters) of giant clams, trochus and blacklip pearl oysters within the lagoon,

- generate any other biophysical information on the marine resources of Jaluit that would be important in the formulation of a management plan for the lagoon.

The selected species were: giant clams (*Tridacna gigas*, *T. maxima*, *T. squamosa*, *Hippopus hippopus*), trochus (*Trochus niloticus*), blacklip pearl oyster (*Pinctada margaritifera*), groupers (*Epinephelus microdon*, *E. maculatus*), and rainbow runner (*Elagatis bipinnulatus*).

### Executive summary

Visual resource survey methods (manta tows, timed swims and line transects) were used to evaluate the marine resources of Jaluit Atoll. A total of 231 tows (199 lagoon, 32 ocean side) cov-

ering 80 hectares were conducted during the evaluation. Data collected for each tow included: water depth, tow width, tow length, total number of trochus, clams, pearl oysters, fish, sea cucumbers, per cent coral cover, per cent cloud cover, wind conditions, and latitude and longitude coordinates.

Marine biodiversity is high at Jaluit Atoll. Invertebrate and vertebrate species diversity and stock abundances were also high, with reproduction and recruitment occurring. Reef passes and ocean-side reefs had higher species diversity than lagoon reefs. No evidence of destructive fishing methods was found. Nine mangrove forests were found within the atoll, all of which are unique and require further scientific study.

Four areas of the Jaluit lagoon are recommended for designation as marine reserves (north western section of the lagoon and the three main water passes). The selection criteria determining these reserve locations included species diversity, species abundance, accessibility and uniqueness. The dimensions and precise location of the four suggested marine reserves are flexible and must be determined through discussions with all stakeholders. All reserve areas should include the reef flat down to the 100-meter mark outside the lagoon. All organisms located within this area should be protected.

A community-based questionnaire was used to assess the intensity of giant clam, pearl oyster and trochus utilisation, and social attitudes towards conservation.

In addition, the questionnaire was used as a training exercise for the newly appointed CASO officer. Giant clams and trochus are staple food items within the atoll and are consumed either weekly or on a monthly basis. The majority of respondents collect these animals themselves, however some bartering and cash purchasing occurs. Over 80 per cent of respondents indicated that these animals are becoming scarce; respondents stated they would welcome and support a conservation program.

All respondents were aware of national regulations pertaining to the collection and sale of trochus, although they were unaware of pearl oyster regulations. A traditional marine management system called "MO" has been used to protect both marine and terrestrial resources in the past and may be a useful tool for all marine management plans for this atoll.

Population stock abundances of Epinephelinae fish (*Epinephelus polyphkadion*, *E. maculatus*, *Plectropomus laevis*, *P. oligacanthus* and *Variola louti*) and the rainbow runner (*Elagatis bipinnulatus*) are high and the current level of subsistence harvesting appears not to be detrimental to these fish populations. No commercial activities currently target these fish; however, management protocols should be introduced for all species of fish utilised for commercial purposes. These protocols could include limits on size, gender, space and location, and should include protection programs for breeding purposes. The collection of biological information (fork length, weight and gonad index) must continue to provide evidence of the annual reproductive cycle, the minimum size of maturity for each gender, and population structures over an annual period for each species. Such data are imperative for the

development of specific management protocols. Clarification of the location and timing of grouper reproductive aggregation sites must be determined and included in the management plan.

Population stock abundances differ for each species of giant clam. *T. maxima* are the most abundant species and high numbers were located throughout the lagoon. Current subsistence harvesting of this animal has caused localized population declines on some reefs, especially those close to inhabited islands and popular fishing grounds. Population numbers of *T. squamosa* and *H. hippopus* were low and these clams urgently need to be conserved through an appropriate management plan. No specimens of *T. gigas* nor, the introduced *T. derasa* were located. It is suggested that both species are extinct from this atoll.

Blacklip pearl oysters (*Pinctada margaritifera*), both mature and juvenile shells, were located within the lagoon. Population numbers varied. Pearl oysters have little if any subsistence value within this atoll and therefore fishing pressure on natural populations is all but absent. However, this oyster is utilised for black pearl production and there is keen interest in developing an industry. A management plan needs to be developed for the commercial exploitation of this species. The removal of live oyster stocks from this lagoon, which has occurred in the past, should be prohibited. The collection of oysters for their shell (button and handicraft trade) at the commercial level should be tightly regulated, if not prohibited.

Stock populations of *Trochus niloticus* on Jaluit Atoll are low. This is a direct result of recent commercial harvesting. It is

clearly evident that trochus stocks need to be conserved immediately before further depletion of this species occurs. A total ban on the commercial exploitation of this species should be considered and maintained until such time that trochus stocks have significantly recovered to allow sustainable harvesting to recommence. Restrictions should also be considered for all subsistence activities. These restrictions could include: size restrictions, reef restrictions (reserves), closed seasons and bans.

Eleven species of sea cucumber were found (*Holothuria atra*, *H. nobilis*, *H. horrens*, *H. edulis*, *H. fuscopunctata*, *Actinopyga mauritiana*, *Bohadschia argus*, *B. marmorata*, *Stichopus variegatus*, *Thelenota ananas*, *T. anax*) on Jaluit's reefs. Population abundances are high for all species except for the commercial species currently harvested. Stocks of *H. nobilis*, *H. fuscopunctata*, *B. marmorata*, *S. variegatus*, and *T. ananas* are low to very low within the lagoon as a direct result of current commercial harvesting. Stock populations of these animals below 20 meters depth are unknown.

Management protocols need to be developed and implemented to preserve the existing stocks of commercial sea cucumbers to allow recruitment and sustainable commercial harvesting. Suggested protocols to consider are: bans on the collection of certain species, bans on collection locations, size limits, season limits and closures.

The crown of thorns starfish, *Acanthaster planci*, was found in very low numbers on Jaluit and are not considered a threat to the reefs at this time.

Two species of tropical lobsters were found in Jaluit, *Panulirus penicillatus* and *P. versicolor*. The former was more abundant.

Anecdotal information indicated that *P. longipes fermoristriga* is also present, but was not seen during the survey. Thirty specimens of *P. penicillatus* were examined; over 50 per cent of female lobsters were either carrying eggs or had signs of recent release of eggs, clearly indicating that this species is reproductively active during the summer months. Only one immature specimen of *P. versicolor* was located during the survey. Additional information is required to provide evidence of this species' reproductive cycle. The current subsistence harvesting of *P. penicillatus* and *P. versicolor* on Jaluit Atoll appears not to be detrimental to populations on the reefs, and therefore, no immediate management action needs to be implemented. Management protocols must be developed and implemented if and when commercial harvesting of these species occurs.

A number of recommendations, based on the results of this study, are discussed for each organism. An overall monitoring program must be implemented. The monitoring program has been designed to provide baseline scientific information on the life histories of these animals and their abundance. Information gained from this program is essential for the development of appropriate management plans. The designation and policing of the recommended marine reserves should be undertaken immediately. Management plans must be developed for all future commercial fishing and harvesting of marine resources.

### **Recommendations**

Jaluit Atoll's marine resources require management. Without an adaptive, useable management plan, stock populations of marine organisms will be over exploited.

The priority activity should be the collection of basic life history data on the organisms discussed in this paper. Data (biological and morphological) must be collected on a monthly basis over an annual period for each organism. The biological information obtained for each individual species is imperative to the development of a suitable management plan. Data must include: date of sample, location of sample, sex and maturity of animal, body length (fork length, carapace length), total weight, reproductive condition, and gonad index.

In addition, marine resource stock surveys (as undertaken in this evaluation) should be repeated, at least on an annual basis, to provide information on the population structure and abundance of marine organisms within the lagoon.

Data collection should be undertaken at intervals of three months on the four existing giant clam monitoring transect sites. Additional transect sites, including coral monitoring sites, must be developed in the suggested marine reserve areas once the reserves have been developed.

The four marine reserves recommended should have boundaries identified and passed into legislation as swiftly as possible; all marine life in these reserves should be preserved and protected.

The suggested community-based fisheries questionnaire should be used to assess the patterns of exploitation of fisheries resources, the main methods of fishing and the most common species caught.

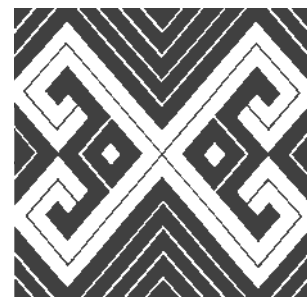
The above activities should form part of the CASO offi-

cers' work plan. The CASO officer should provide marine education and awareness training programs for the community on all aspects of coral reef management, and conduct regular community meetings to discuss the management program.

A marine evaluation program is required to determine the spawning aggregation sites of the dominant Epinephelinae fish species. The timing of this program will be determined from the CASO monthly examination of fish gonads.

A resource evaluation is required to determine the existence, abundance, and location and population size of mangrove crab and coconut crab populations within the atoll. This evaluation should also provide information to assist in the development of a management plan for each species.

Immediate conservation measures should be implemented to prevent further exploitation of trochus and commercial sea cucumber stocks. A total ban on all commercial harvesting of trochus should be considered. Regulations should be introduced to decrease the fishing pressure on the existing stocks of commercially valuable sea cucumbers.



## NEWS FROM IN AND AROUND THE REGION

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All new commercial marine harvesting activities should be prohibited until such time that sufficient biological information has been collected to develop correct management protocols.

The artificial culture of pearl oysters for the pearling industry should be considered.

(Prepared for the Marine Management and Conservation Area Project, RMI, funded by SPREP and prepared by Stephen Lindsay, Micronesian Aquaculture and Marine Consultant Services: [slindsay@mail.fm](mailto:slindsay@mail.fm))

