6 ALTERNATIVE METHODS FOR ACCELERATING REGROWTH

Alternative ways of accelerating coral growth were evaluated.

6.1 SELECTION OF CORAL TRANSPLANTS TO MAXIMISE SEXUAL REPRODUCTION

Initial studies emphasised the selection of corals to maximise the possibility that the colonies could reproduce and therefore add reproductive products to the reef. This could be achieved by transplanting well before the breeding season (spring/summer for most corals); by selecting hermaphroditic species (i.e. coral species which have colonies that contain both male and female reproductive organs) and therefore doubling the chances of successful fertilisation; by selecting colonies of reproductive size; by selecting several colonies of the same species instead of one of each of many species, etc.

This is probably unnecessary as recent studies indicate that coral planulae have the potential to disperse widely from their reef of origin. Increasing the amount of reproduction on a damaged reef will not necessarily increase recruitment on that reef, though it may effect a reef 'downstream'. This was confirmed during our study at Green Island (Harriott and Fisk, 1988).

6.2 INCREASING SETTLEMENT SURFACES

The rate of recruitment of juvenile corals may be increased by providing suitable surfaces for coral attachment (e.g. dead coral), or by removing competing animals such as soft corals.

This is considered impractical, and probably unnecessary. At Green Island there were abundant coral recruits on the available settlement surfaces, particularly dead coral which is a favoured surface and is in plentiful supply after damage by crown-of-thorns starfish. When we added dead coral substrate to the reef floor during our experiments, we found they were buried by the shifting sands after several months, long before the limited season in which most recruitment occurs.

There was no clear relationship at Green Island between the abundance of soft coral and hard coral, and it does not appear that algae and soft coral always take over after damage to the hard corals, as some workers have postulated. In cases where the soft coral cover is so high as to cover all available space and prevent the settlement of hard corals, there may be a case for the clearance of some free space. However, keeping in mind the objectives for most programs in accelerating regrowth (i.e. to provide an attractive commercial display), it has been our experience that tourists find areas of soft coral attractive, and there would be little commercial justification for their removal.

It may be desirable to increase surface relief in certain cases. This will be labour intensive but worthwhile if the preferred area of enhancement consists of mainly hard smooth substrate (e.g. large dead *Porites* colonies), or if the area to be regenerated has been sheared smooth by an impact. Increasing surface relief by chiselling or drilling holes in the surface will provide safe sites from grazing for newly settled coral larvae.

Damage to reefs may be acute (one sharply defined event) or chronic (occurring over an extended period), and the two types of damage will have different effects on the community. The period of recovery from an acute event will be similar to that following a natural disturbance, i.e. it will depend on the extent of the damage and the condition of the reef

afterwards. Recovery from chronic damage will depend on whether the cause of the damage has ceased, and whether the changes in the environment are long lasting.

6.3 RESTOCKING FROM ARTIFICIALLY RAISED CORALS

It would be possible to transplant onto the affected reef young corals grown from settled planulae in aquaria. This would prevent any damage to the reefs from collection of corals for transplantation, and would increase the chance of survival of the planulae under the protected conditions of the aquarium.

However this was also considered impractical because of the slow growth rate of corals (less than 1 cm across in one year) and high cost of mariculture. Our work has shown that availability of small corals may not be a limiting factor in most cases.

The methods discussed above are probably not feasible as corals are slow growing and have high mortality rates in their young stages. Relying on natural recruitment entails a three to five year delay before the coral community once more resembles a healthy growing one. This period may be too long in some commercial situations.