ABSTRACT: Degraded coral reefs sometimes show very little natural recovery due to factors such as substrate instability. The present decline of the world's coral reefs threaten to deprive people in the coastal areas in many tropical countries of their livelihood. Available methods for reef rehabilitation are too expensive for a wider application in developing countries. This thesis was aimed at developing simple and cheap methods for rehabilitation of degraded coral reefs through transplantation of staghorn corals. A new low-tech method for artificial stabilisation of transplanted staghorn corals on loose substrate was evaluated. The method involved attachment of coral branches on string sections, which were placed on the seabed and connected to form a grid. After 23 months, the average cover of transplanted *Acropora formosa* had increased by 51 %, and promoted colonisation of other sessile biota. The attachment to strings had a significant positive effect. In a second follow-up study, two species of staghorn corals transplanted with the string-grid method showed an annual net increase in live weight of 56 %, compared to 8 % for the unattached control. This method is simple to apply, and does not require expensive materials or equipment, thus allowing the involvement of rural fishing communities in reef rehabilitation. The method can be used in shallow waters (5-10 m depth) at sites protected from strong wave action.

When transplanting large amounts of corals, transport and handling out of the water for periods up to several hours can be difficult to avoid. The tolerance to prolonged emersion and the effects of desiccation were assessed on three species of staghorn corals. The corals could tolerate more than an hour of emersion in the shade, and this time could be extended to several hours by intermittent splashing with water. Re-distribution of water in the emersed corals seemed to cause significant partial mortality. Horizontal placement or small size of the corals reduced this effect, allowing longer handling times.

Mass coral bleaching and mortality occurred in 1998 due to extremely high sea surface temperatures throughout most of the tropics. Ongoing long-term field experiments were severely affected, allowing an assessment of the intraspecific variation in susceptibility to heat-induced mortality in *A. formosa*. This variability was related to a study on the clonal population structure of this coral. The degree of mortality after the hot-water event varied dramatically between different plots of transplanted *A. formosa*. Self-recognition bioassays and other evidence indicated that each of the studied plots was transplanted with corals belonging to a unique clone. Hence, the observed differences in mortality indicated a genetic variation in susceptibility to heat-induced mortality in the studied coral population or among the symbiotic zooxanthellae.

The change in fish communities associated with plots of transplanted corals before and after the mass mortality was assessed. A distinct shift in fish community composition was found, although diversity was not affected. Fish abundance rose by 39 % mostly due to an increase in herbivores, which seemed to benefit from enhanced algal growth on the dead corals. Fish abundance, species diversity and community composition was also strongly influenced by the structural complexity provided by the live and dead corals. This suggests that a coral reef can support abundant and diverse fish populations also after the corals have died, as long as the reef structure is sustained.

**Keywords:** Coral reef rehabilitation; Coral transplantation; Staghorn corals; *Acropora formosa*; Emersion; Desiccation; Coral bleaching; Fish community; Coral reef degradation