High self-recruitment and export of recruits from a marine protected area in a coral reef fish

F. Huyghe & M. Kochzius
Vrije Universiteit Brussel (VUB), Belgium
Vrije Universiteit Brussel (VUB), Belgium
filip.huyghe@vub.be

As important instruments of marine management, marine protected areas (MPAs) are ideally designed to fulfill a dual role. They aim to function as sanctuaries and preserve species and genetic diversity in the ecosystem, but at the same time they are expected to provide spill-over to adjacent, exploited areas. To assess whether MPAs meet this requirement, one needs to measure connectivity, the exchange of individuals among populations, at both ecological and evolutionary time scales. However, in most coral reef associated organisms, connectivity is limited to dispersal during a pelagic larval phase, which makes measuring connectivity on ecological time-scales, i.e. from one generation to the next, very challenging. We used a set of 13 highly polymorphic genetic markers and parentage analysis to directly measure larval dispersal between Chumbe Island Coral Park (MPA) and Chapwani, a highly degraded reef approximately 12 km north of Chumbe, using the skunk clown fish (Amphiprion akallopisos) as a model species. We collected fin tissue of 260 potential parents at Chapwani and 379 at Chumbe, as well as 192 and 354 juveniles in Chapwani and Chumbe, respectively, over two sampling periods in 2015 and 2016. Self-recruitment was higher at Chumbe (37.6 %) than at Chapwani (23 %). As much as 37.7 % of the new recruits at Chapwani were identified as offspring from adults residing at Chumbe, providing direct proof of the importance of this MPA in terms of larval spill-over. At the same time, 19.7 % of the recruits at Chumbe were dispersers from Chapwani. There was not much inter-annual variation both in self-recruitment and larval dispersal. We conclude that both reefs are well connected through larval dispersal. And although self-recruitment and dispersal are relatively high on both locations, reef health seems to promote both self-recruitment and larval dispersal.