Larval biology and new tools for management of fish stocks

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One of the great mysteries of coral reef fish ecology and biology is how larvae locate the relatively rare patches of coral reef habitat on which they settle. The answer must lie partly in the sensory abilities of fish because it seems unlikely that successful settlement is solely a matter of chance. The oral presentation will show how can we estimate, by experiments in aquaria, the sensory abilities of coral reef fish larvae when they search for a settlement habitat? Larval recognition of settlement habitat may involve the detection of conspecifics or of shelter characteristics (e.g., shape of coral colony, odour of anemone) determined by emissions of visual, chemical and mechanical cues. These cues could be recognized by five senses of fish larvae: visual cues by sight, chemical cues by smell or taste, and mechanical cues by hearing (sound is captured by otoliths) or vibratory sense (vibrations are captured by lateral line). For the study, larvae were captured with crest nets and were then introduced into experimental tanks that allowed testing of each sense separately. This kind of study can be groundbreaking in terms of understanding connectivity of fish populations among habitats in coral reef metapopulations, which will assist conservationists and reef managers concerned with maintaining biodiversity on reefs that are becoming increasingly degraded.

Beside this kind of study, the development of tools for larval collection of reef fish (crest nets, light traps) is one of the issues for sustainable exploitation and management of fish stocks. If the cycle of reef fish has already been described, some geomorphologic parameters (low tides, reef rings well developed) could emphasize colonisation and/or capture of larvae coming in the reefs. As French Polynesia shows those characteristics, a new industry (Rangiroa, Bora Bora, Moorea) based on collection, transport, sorting, weaning and rearing techniques of fish larvae is raising. Advantages and inconveniences of collection and exploitation of larvae are described. The impact on the stocks of such an exploitation is relatively low compared to adult fishery. Moreover, these new techniques are seen as eco-friendly, as their use is not only for (ornamental) trade market, but it could help to develop ecotourism and a better management of fish stocks. Some benthic species have already been enhanced with success (more than 60% of settlement after three days) and the protocols are now used by two local companies for ecotourism stock enhancement, another key issue for a success story of this activity. For nectobenthic species, results of settlement (14% or less after ten days) are actually not sufficient to be sustainable, so new technical and socio-economic studies have to be undergone. In this situation, the knowledge about larval recognition of settlement will be very important as it could lead to new technology and know-how that can increase survival results of stock enhancement. The wished impact is as good on fish stocks as on consciousness raising of fishermen about fish stocks conservation.