Proposal Master Thesis Jessica Knoop:

The effect of different coral growth forms on the progression of coral-algae interactions

Current knowledge and aim of the study

Coral reefs are one of the most diverse marine ecosystems in the world, forming highly productive areas in tropical regions that exhibit otherwise low productivity rates [1].

Increasing environmental changes, for example the reduction of herbivory [2], eutrophication [3] and climate change related stressors [1], like higher water temperatures, can lead to a shift from a coral dominated reef to an algae dominated reef. These phase shifts are characterized by lower coral cover and diversity, decreased fish stocks and a shift in macroalgae composition from turfing and calcified algae towards higher abundance of larger fleshy macroalgae [4].

Recent findings show that coral growth forms seem to have an important influence on the outcome of coral-algae interactions. Haas et al. (2010) found evidence that fast-growing branching corals are more vulnerable by algae interactions than slow-growing massive coral, suggesting an ecological trade-off between faster growth rates and defending mechanisms [5].

Many studies investigated coral-algae interactions around the globe, while little knowledge is available about the situation in the Gulf of Thailand, where the following study is planned in the Bay of Mae Haad on Koh Phangan[6].

The aim of the study is to get further evidence, if branching coral growth forms are more negatively influenced by interacting algae than massive coral growth forms.

Therefore the study is proposed to answer the following key questions:

1. How is the benthic community structure characterized and how is the percentage interaction of corals with algae?
2. Are there differences in the progress of coral-algae interactions with different competitors?
3. Does different coral morphology have an influence on the outcome of coral-algae interactions?

Experimental Design

1. To assess the benthic community structure and the relative seafloor cover by corals, macroalgae and turf algae, line point intercepts (LPI) transects after Hodgson et al. (2004) will be conducted in 5 m water depth [7]. The benthic coverage will be determined at 0.5 m intervals, resulting in 100 data points per transect line. The interaction of corals and algae will be quantified by 1 m² quadrates that will be positioned randomly left and right along a transect line as described above. In this quadrates the direct contact of corals with algae will be determined.

2. Different Coral-algae interactions will be identified in the area were the LPIs transects were carried out. To investigate differences in the progress of coral-algae interactions with different competitors, interactions including various types of algae and corals should be found, marked with small floating buoyes, and observed over a period of 3-4 months weekly by taking pictures. Afterwards the alteration of coral tissue loss will be determined by comparing the pictures, using a digital image software.

3. Massive and branching corals that are in contact with algae will be located in the same area as above and will be also marked for further investigation. To prove if there are differences in the progress of coral-

algae interactions between fast-growing branching and slow-growing massive corals the marked interaction sites are studied as described under 2.

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