Research Update

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Project title: "Coral reef community metabolism, with a focus on mass coral spawning."
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Overview:
Tennille is studying the community metabolism of coral reef ecosystems, with a particular focus on oxygen demand. Of key interest is the change in oxygen metabolism through the coral reproductive cycle, and the influence of mass coral spawning on water column oxygen levels, which has led to large fish kills in the Coral Bay region. Initial work will establish baseline "natural" rates of photosynthesis, respiration and calcification and overall oxygen demand of the system. Natural observations and manipulative experiments will examine the effect of temperature, spawning slicks, sedimentation and nutrient influx on these processes. As these environmental variables are of particular concern at Ningaloo Reef it is important to understand whether our coral reef communities can survive potential perturbations and if so how will they be altered.

Sexual reproduction has narrower tolerance to stress than other life functions, and as a result corals divert resources away from reproduction in response to variety of sublethal stresses. Additionally, as the gametogenic cycle of corals at Ningaloo Reef occurs during a period of natural environmental extremes, with some evidence such as bleaching to suggest corals are under stress, it is possible that the tolerance of corals to additional perturbations may be lower than normal.

Key questions being addressed include:

- What are the baseline rates of photosynthesis, respiration and calcification of corals?
- What influence do temperature, sediment load, nutrient input and mass spawning have, individually and in combination?
- How do these processes affect overall oxygen demand of the coral reef ecosystem?
- Is there a change in metabolic stress in corals during the coral reproductive cycle?

A programme of field and laboratory experiments will address these questions.

Methods:
Field studies using benthic metabolic chambers will examine natural processes on coral colonies in situ. These measurements will be supplemented by laboratory studies looking at physiological stresses of corals. The project will involve both baseline studies, and supplemental studies relating to changes during the coral reproductive cycle.

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