Marine Ecology Honours Projects for 2013

Are you interested in understanding how complex seagrass communities will cope with climate change, or how we can predict, using experimental approaches, what impacts will occur in the future?

Do you wonder about the severity of the threat posed by ocean acidification to marine organisms that produce hard skeletons, and what impact a loss of vulnerable species will have on a temperate ecosystem?

If so, you may be interested in one of these 2013 Honours research projects on offer!

Project: A window into the future: using warm water plumes in Lake Macquarie to determining how seagrass populations will respond to future climate change

Supervisors: Dr Adriana Verges, Dr Ross Hill

Lake Macquarie is home to large populations of temperate seagrass communities which provide an essential food source and habitat for countless invertebrate and vertebrate species. Seagrass beds are also responsible for the capture and long-term storage of carbon, making them effective reservoirs of anthropogenic released carbon dioxide. However, despite their ecological value, seagrasses are in decline globally and climate change is threatening their future existence.

On the shores of Lake Macquarie sit two coal-fired power stations. The warm water plumes emerging from these power stations create “natural” mesocosms for understating how elevated temperatures impact seagrass ecosystems. By completing transplant experiments, this project will investigate how rising temperatures will affect seagrass productivity in regions exposed to different thermal regimes. Additionally, the upper thermal threshold of seagrass communities acclimated to different temperatures will be characterised in the laboratory at the Sydney Institute of Marine Science, to determine the capacity for seagrass to acclimate to rising temperatures. The student will be involved in extensive field and laboratory work, and be responsible for measures of seagrass survivorship, growth and productivity.

Project: Impact of ocean acidification and warming on habitat-forming algae along temperate coastlines

Supervisor: Dr Ross Hill

Climate change is expected to have profound impacts to near-shore marine ecosystems and their resident organisms. They provide essential ecological services, such as the construction and cementation of calcium carbonate structures, acting as bioengineers and maintaining biodiversity. The anthropogenic release carbon dioxide (CO₂) is resulting in more acidic conditions in the ocean’s surface layer. As a result, calcium carbonate producing marine organisms inhabiting this zone are predicted to be affected due to lower pH and a reduced abundance of carbonate ions required to form their calcified structures. Greater atmospheric CO₂ concentrations are also warming the globe and in some calcifying species, this change is expected to further compound the stress posed by ocean acidification.

The main objectives of this research will be to evaluate the individual and synergistic effects of elevated CO₂ conditions and elevated temperature on photosynthetic marine calcifiers, and identify geographical differences in calcifying species responses to climate change. To complete this project, the student will be involved in field surveys and sample collection. Manipulative experiments will be completed at the Sydney Institute of Marine Science where samples will be exposed to future climate change scenarios. Laboratory work will involve measurements of growth, photosynthesis and calcification, along with monitoring of seawater chemistry in the treatment aquaria.