# Observations on Growth of Reef Corals and Sea Grass Around Shallow Water Geothermal Vents in Papua New Guinea

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**Background**

A never ending litany of purported environmental threats to the Great Barrier Reef has maintained a generous flow of funding for several generations of researchers and the reef salvation industry now brings about $100 million annually into the local economy in North Queensland. Although none of these threats has ever become manifest as a serious impact and all of the millions of dollars in research has never found any effective solution for anything, the charade never seems to lose credibility or support.

The popular threat of the moment is ocean acidification from increasing atmospheric $CO_2$. The Great Barrier Reef Marine Park Authority cite research claiming that coral calcification is in rapid decline from acidification despite the obvious contradiction of surprisingly rapid recovery from storm and bleaching damage. They also propagate predictions that oceanic pH may decrease (*i.e.* become less alkaline) by as much as 0.4 of a pH unit by 2100 and that this will be disastrous for coral calcification.

It should be noted, however, that oceanic pH would then be about 7.8, which is still alkaline as 7.0 is the neutral point on the pH scale. The evidence for detriment to corals at pH 7.8 is dubious. Some experiments indicate decreased calcification, others an actual increase. The problem with such experiments is that there is always considerable uncertainty over whether an observed result is due to the factor being tested or to some other unrecognised influence of the artificial environment of an experiment.

Most modern reef coral genera have fossil histories going back from 5-10 million years to over 100 million years. During this time they have survived both ice ages and periods when climate was warmer than even the most extreme predictions for warming from $CO_2$ emissions. Geological evidence indicates they thrived when $CO_2$ was at 5-10 times current levels. This is far higher than we might reach before running out of fossil fuels. In some areas modern day reefs with healthy corals flourish where the pH is as low as 7.8 and disaster for the GBR at this level is more the perverse hope of alarmists than it is a probability.

**Introduction**

At several locations in Papua New Guinea there are submarine geothermal vents in shallow water where concentrated $CO_2$ continually bubbles up from the substrate amidst healthy coral growth. Although well known to recreational divers, this natural experiment in the effects of enhanced CO2 seems not to have yet been investigated by researchers concerned with ocean acidification. Perhaps the cogitative dissonance with alarmist belief has deterred them.

Recently Mr Jeff McCloy of Newcastle, NSW invited me to join him on his yacht *Seafaris* in PNG. When told of my interest in the geothermal vents there, he generously offered to take me to them.

I will digress briefly to comment on *Seafaris* as it is a truly unique vessel. In 2008 she was awarded both the Australian and World Superyacht of the Year awards. Jeff managed the building project himself and every detail reflects both elegance of design and craftsmanship as well as practical functionality, something rare in superyachts. I will mention only one of many superb features. This is a hydraulic cradle which carries a 9m water jet driven tender which can be launched and recovered at the touch of a button.

**Observations**

On 14 February 2010 we visited two geothermal areas in the D'Entrecasteaux Islands, Milne Bay Province, PNG. One is located near the north end of Normanby Island about 30 m S.E. of the outer end of the wharf at the village of *Esa'Ala*. The other is a well known dive site known as the "Bubble Bath". It is located about 20 m offshore near the mid-north coast of Dobu Island, an extinct volcano.

At *Esa'Ala* the area of bubble venting is scattered along the inner edge of a fringing reef which is about 10 - 15 m in width. The outside edge slopes steeply into deep water and the inside edge is bordered by grass beds (*Thalassia* sp.) on silty bottom of mixed reef and volcanic sediments. The bubbling is near continuous small trickles at numerous points scattered amid both grass and coral areas in water depths of 3 – 5 m. The location is sheltered from prevailing wind and wave action.

Both coral and plant growth were unusually luxuriant. In the grass beds small juvenile rabbitfish (*Siganus* sp.) are abundant feeding on the epiphytic algae growing on the grass blades.

At the "Bubble Bath" location near Dobu I. the bubbling was much more vigorous. In addition to more numerous and larger bubble streams amid both coral and grass beds, there was a main vent which emits a large volume of gas not unlike a Jacuzzi bubble bath in volume (around a cubic metre a minute). From the only mild odour of hydrogen sulphide it seemed apparent that the main gas being emitted was $CO_2$. Both plant and coral growth seemed more luxuriant than at *Esa'Ala*. Water depths were 2-3 m and the location was again a fringing reef protected from prevailing wind and waves. The grass beds were dense to within a meter of the main vent and the coral reef began about 10 m away.

Both locations were sheltered from currents and would have a poor supply of planktonic food. It seemed apparent in both that the unusual profusion of both grass and coral growth was most likely attributable to the gas vents.

The pH of water samples was measured using a Pacific Aquatech PH-013 High Accuracy Portable pH Meter with a resolution of 0.01 pH. It was calibrated with buffered solutions at pH 6.864 and pH 4.003 immediately before measuring the samples. The *Esa'Ala* sample was taken immediately adjacent to a *Porites* coral and about 10 cm from a small bubble stream. The pH was 7.96. A sample from next to a *Porites* coral at the "Bubble Bath" measured 7.74. This was also about 10 cm from a somewhat larger bubble stream and about 12 m from the main gas vent. A sample next to the main vent measured 6.54. A sample from the open ocean just outside Egum Atoll about 100 Km N.E. of Dobu read 8.23 which is near typical for open ocean in this region.

It seems that coral reefs are thriving at pH levels well below the most alarming projections for 2100. The biggest threat we face isn't to Barrier Reef tourism. The whole modern economy is founded on cheap abundant energy. High energy liquid fuel is essential to all mobile heavy machinery. Trucks, tractors, trains, ships, planes and earth moving equipment cannot be run on sunbeams and summer breezes. The International Energy Agency along with virtually all oil industry analyst groups now recognise that future global oil supplies are likely to be increasingly tight and more expensive.

The Climategate affair and its ongoing revelations have exposed a deep systemic corruption at the heart of climate science. Unfortunately this corruption is not restricted to climate science but is endemic across the environmental sciences which have become more of an ideology and a scam than they are a science. It is time for society to wake up and begin to realise that we have been repeatedly and blatantly lied to. It is also past time to start seriously thinking about how we are going to find enough liquid fuel to keep food on our tables and maintain our economy over the decades it will require to develop and implement viable alternative energies. Recognition is also overdue in realising that we have been fools to let this nonsense strangle our producers. We are now paying the price with food we can barely afford and more and more of which we cannot.

**Acknowledgements**
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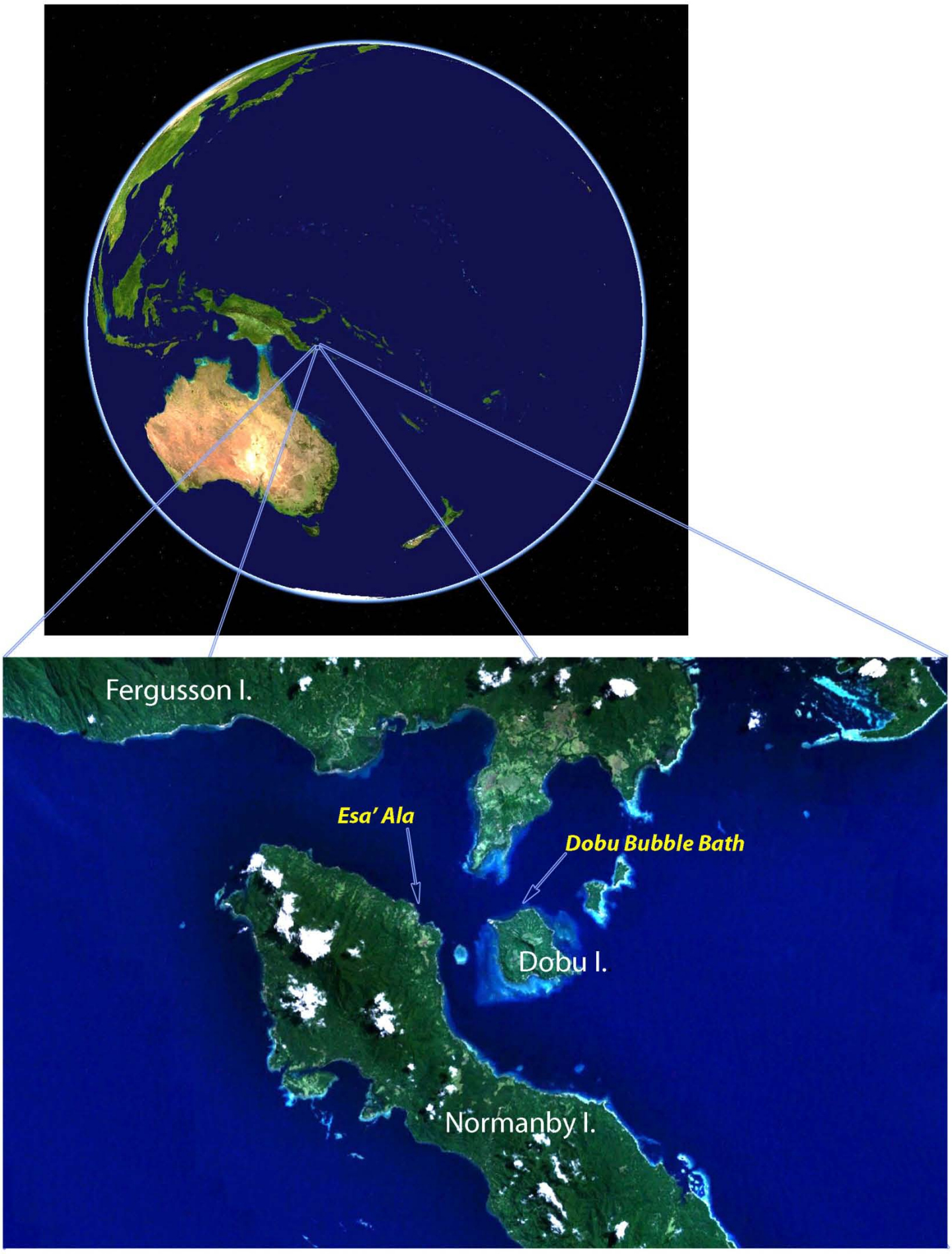
# Photos

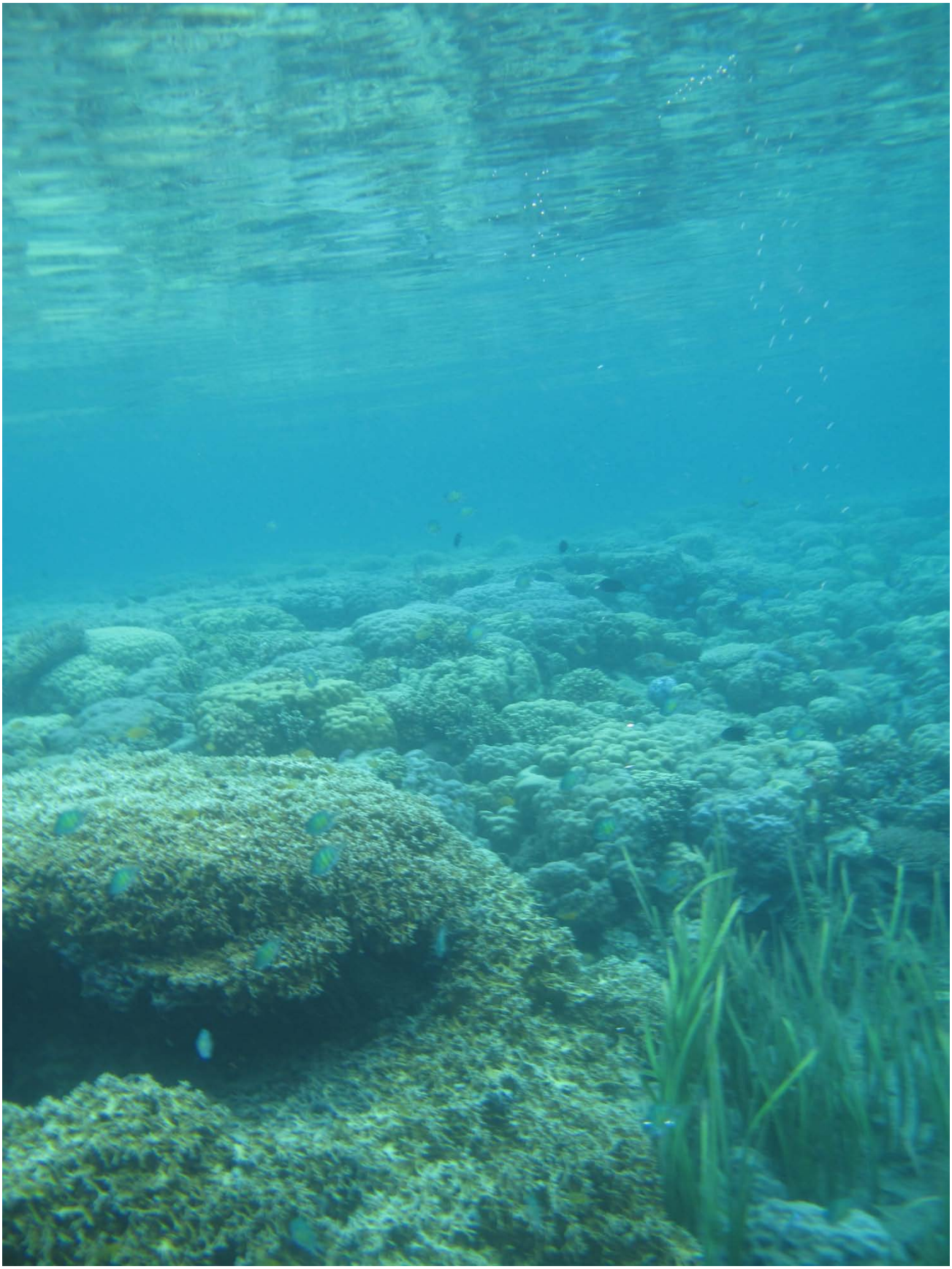
M/V *Seafaris*




Geothermal vent locations visited on 14 February 2010

Wharf at Esa'Ala village. Bubble area indicated by white ellipse at left.

Bubble streams and grass beds at Esa'Ala



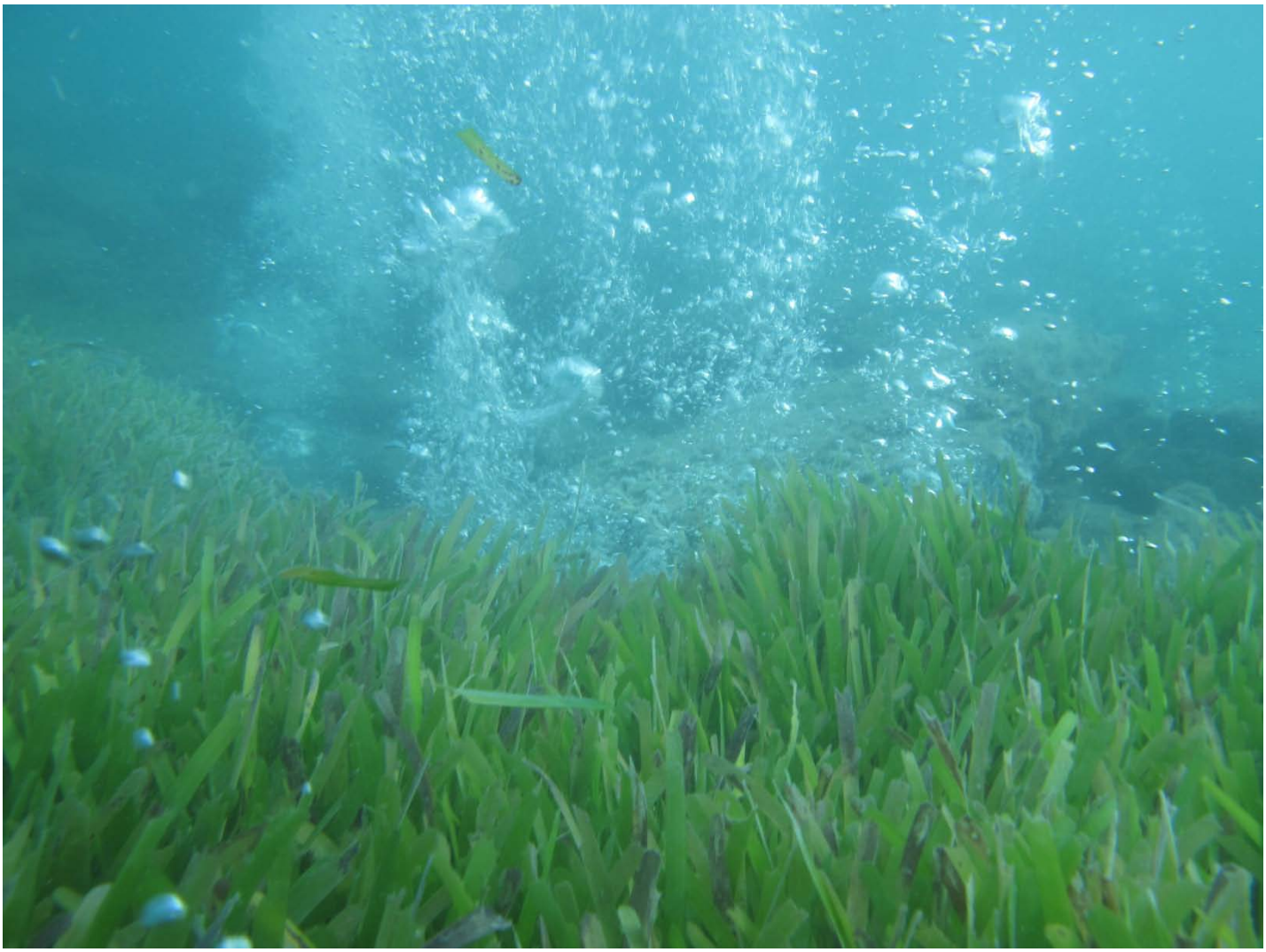
Lush *Porites* and other corals bordering bubble area at Esa'Ala.

Dobu I. from N.E. with Normanby I. in background. Bubble Bath location indicated by white arrow.

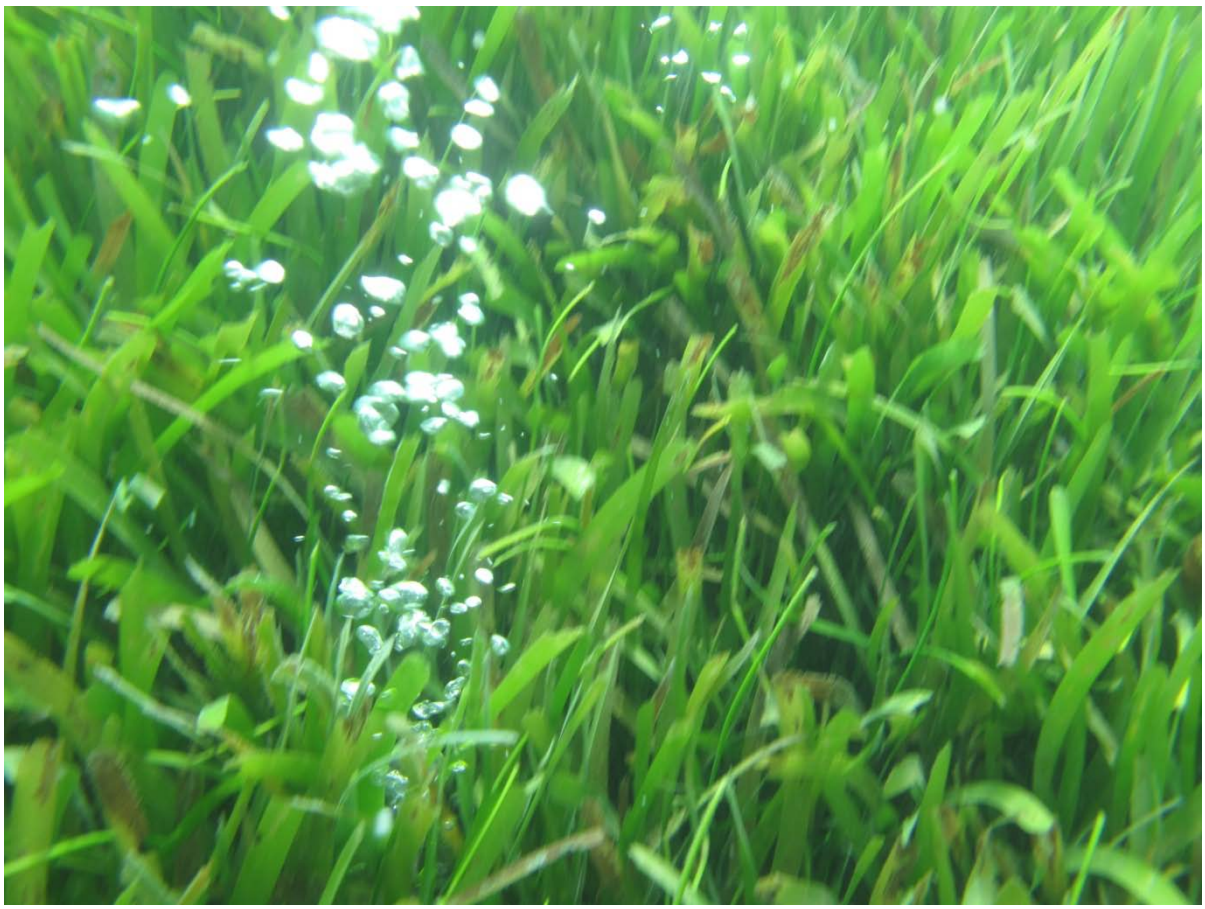
Dobu I. Vent location is just this side of the point of land.

Dobu I. Bubble Bath view looking East, with main vent at right.

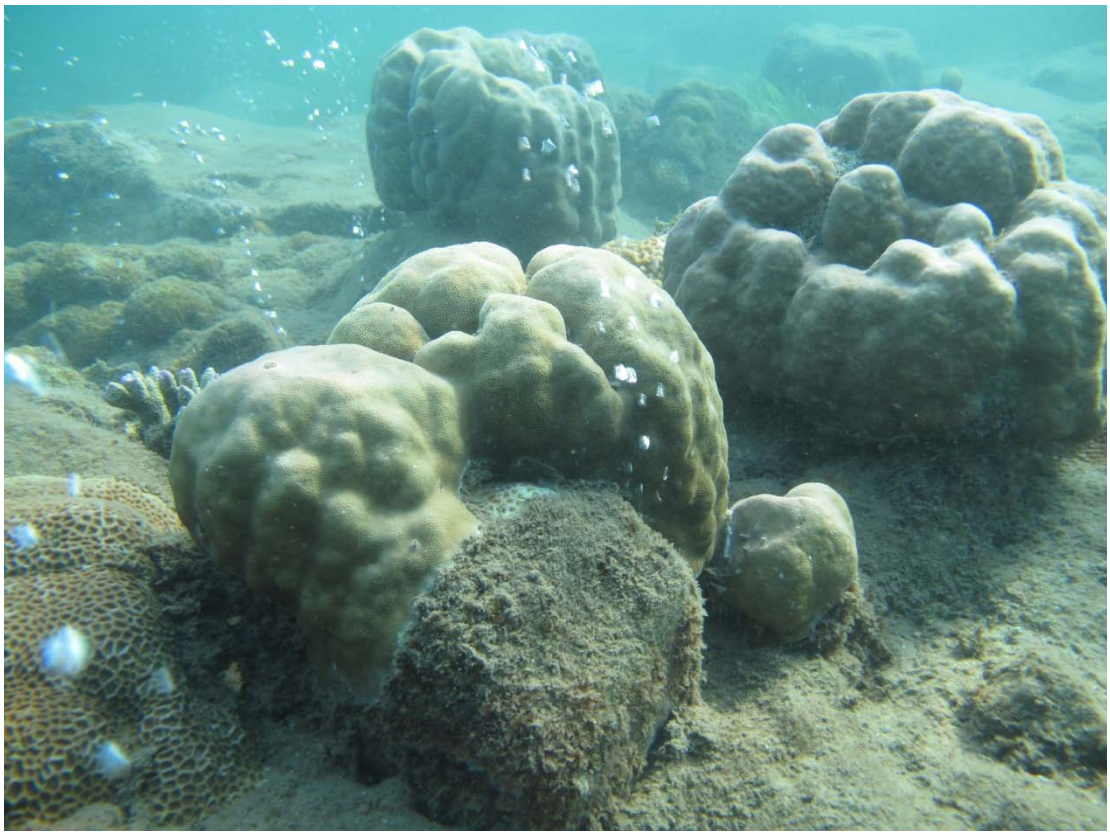
Dobu I. Bubble Bath view looking S.W. with main vent at lower middle.



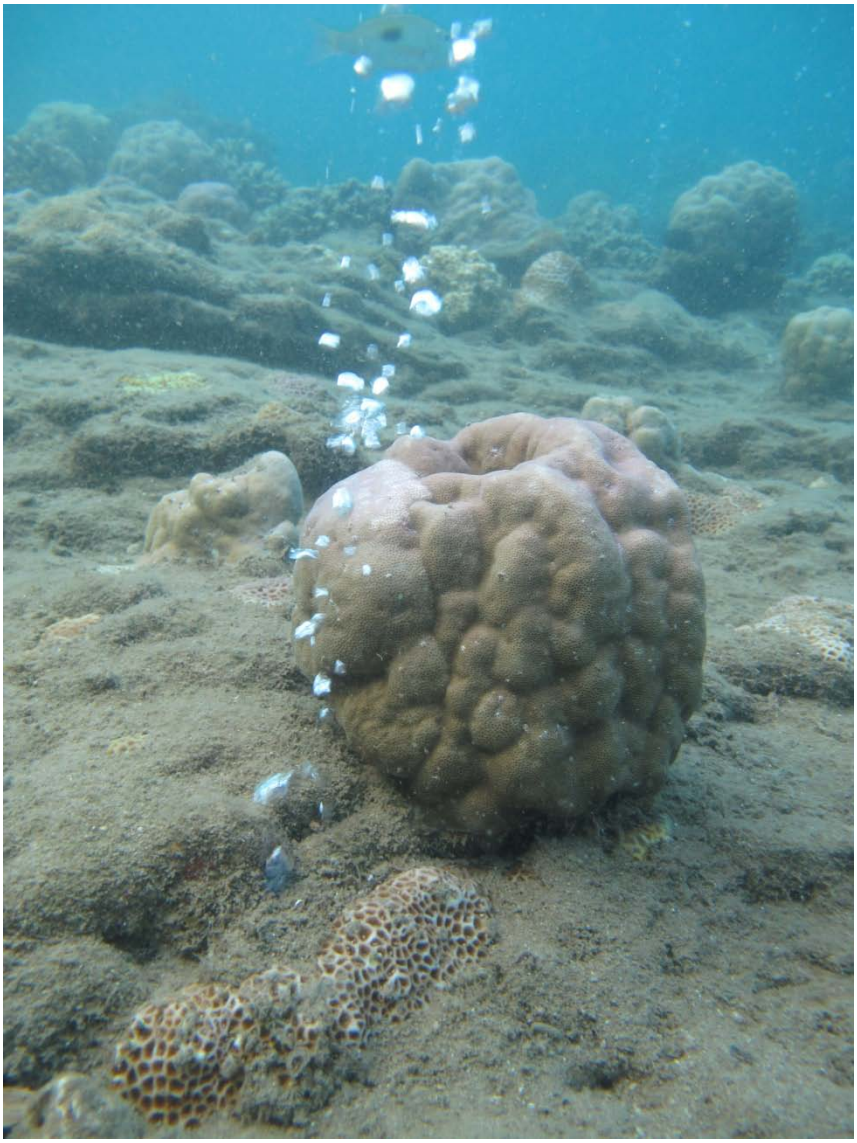
Underwater view of Bubble Bath main vent.

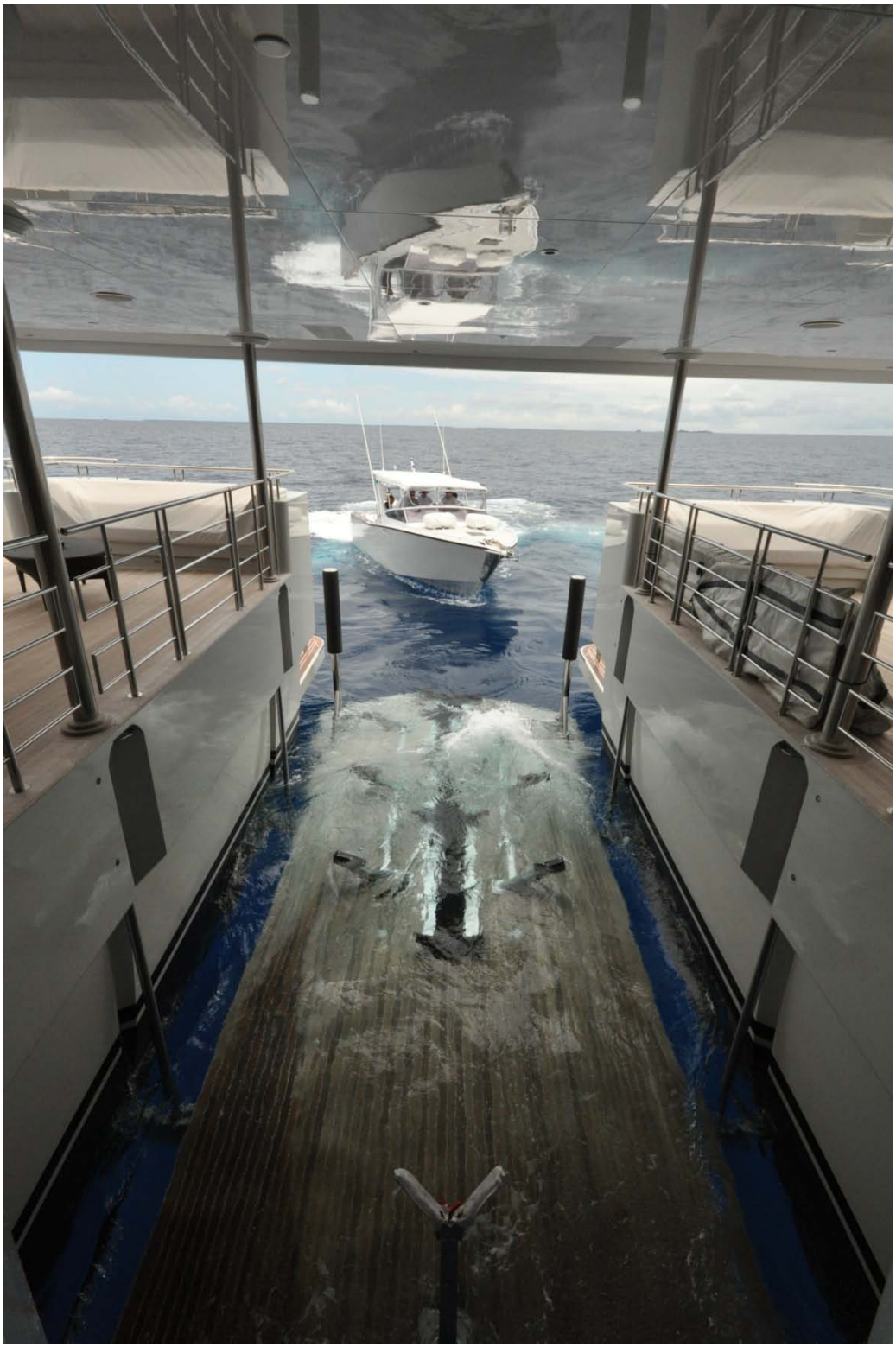


One of the numerous smaller bubble streams coming up through lush beds of *Thalassia*.



Dobu I. corals aerated by bubbling $CO_2$.





*Seafaris* launch driving onto hydraulic cradle
where it will be quickly lifted to main deck level.