

Review of

## **“Relevance of coral geometry in the outcomes of benthic competition”**

George et al. submitted to PeerJ (#52432)

### **General comments**

The main goal of the study is to find out whether there is a relationship between coral geometry / morphology and space competitiveness. This is an interesting question for an ecologist. Not being a mathematician, however, I find the approach sometimes hard to follow and it seems overcomplicated. I provided specific examples below.

I find it hard to understand the term “fractal” or “fractal dimension”. I get the sense that fractal is some sort of ratio, but at some point (L127/128) it says “... and the question of whether or not these features are fractal remains unanswered.” Doesn't every object have a fractal dimension, including corals? What exactly is fractal dimension in the context of coral morphology?

I'm not able to judge whether the methodology is appropriate with respect to 3D models and fractal dimensions.

Is there any literature that report photosynthetic rates or feeding rates of some of the coral species tested? This may support your hypothesis that increased energy uptake due to certain morphologies may provide support competitiveness for space.

Your categorization of competitive loss should be described a bit more careful. The loss of tissue could also be due to disease or grazing, not just due to space competitors. This should at least be mentioned.

At several places in the manuscript the term “coral outcome” is used (see examples below). This seems incomplete. It should be “coral competitive outcome”.

Nice figures!

### **Specific comments:**

L37: Replace “energy harvesting” by “energy gain”

L37: What is a fractal dimension? Is it the ratio of 3D to 2D surface area?

L39: Do you really mean “outcome against other benthic organisms” or should “outcome” be “competition”?

L42: What is the definition of losing and winning? How was that tested? What's your indicator? Should be mentioned briefly in the abstract.

L44 & L45: I find the expression coral outcome very strange. Is there another word you can use? I'm not even really sure what this means.. Do you mean competitive outcome?

L66: change to “where polyps interact with other benthic organisms..” (corals are benthic organisms, too.)

L68/69: neither overgrow nor be overgrown – Do you mean interacting organisms avoid each other? Maybe rephrase, since this part of the sentence sounds a bit awkward.

L71-73: The list of defenses needs to be completed. For example, instead of just saying “sweeper tentacle and / or mesenterial filaments” say “the extension of sweeper tentacles ...”. Same for chemical warfare...

L192: Should read “ with respect to the 3D model”

L269: Should read “ with respect to the topological ...”

L269-273: Not being a mathematician, I find it hard to understand what the different dimensions are (topological dimension of the surface and of the perimeter, fractal dimension, different resolution of measurements, etc.). It seems overcomplicated.

L343-344: Should read: ‘in predicting coral competitive outcome”

L375: What do you mean by longitudinal studies?

L379 -395: It would be good to provide a concrete example how the coral morphology of the most successful coral species looks like and how this translate to higher energy uptake (in particular for L381-384). Again, I find it hard to really understand the term fractal dimension and how it translates to commonly known coral morphology characteristics, such as polyp size, polyp depth, tissue thickness, branch complexity, etc.

L385-386: What do you mean by holes and gaps?

L424/425: I would replace “coral competition outcomes” with “coral competitive advantages (or success)”

L427: should be “coral competitive outcome”.

L430 Should be “.. outcomes of coral space competition with other sessile organisms..”