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Escalating Science Communication through Innovation

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Abstract

If you can find a project or a way to reach your target audience on a large scale, then you've hit the jackpot. The Museum of Underwater Art installed on the Great Barrier Reef in 2017 contains the largest underwater sculpture in the world. It is an innovative project with a focus on people, planet and profit that has a huge wow factor and has reached previously unthinkable, massive global audiences of over 184 million people through the unique combination of world class art, community science and coral reefs. The biomorphic Ocean Sentinel sculptures of scientists and conservationists make locals proud, and tourists go to learn, be inspired, and take action to protect the Great Barrier Reef. Here we show that scientists communicate with relatively small numbers of (generally) scientists. However, the Museum of Underwater Art allows a collaboration between art and science to amplify the audience reach by up to 6,500 times. A future challenge is to contextualize the current global coral bleaching and build on communication to leverage behaviour change for climate action.

Keywords: Ocean sentinels; climate change, overfishing and destructive fishing, coastal development

Introduction

The world is full of uncertainty. Monumental challenges—including climate change, poverty, and war—are at the forefront of daily life and becoming ever more urgent. Key barriers to adaptation are limited resources, lack of private sector and citizen engagement, insufficient mobilization of finance (including for research), low climate literacy, lack of political commitment, lobbying from commercial interests, limited research and/or slow and low uptake of adaptation science, and low sense of urgency [1]. This article is a good news story focusing on a project that addresses at least three of these barriers: private sector and citizen engagement, low climate literacy and limited research and/or slow and low uptake of adaptation science. But it is not a great news story because there is much more work to do urgently. Most scientists disseminate their findings only to peers. About half of them do not perform public outreach at all, considering it to be ineffective [2]. The other half

does minimal outreach, mainly focusing on school children.

Coral Reefs in Crisis

More than 75% of all coral reefs on the planet are currently threatened by a combination of stressors including climate change, overfishing and destructive fishing, coastal development, pollution and damage. As they deteriorate, fish populations disappear, reefs provide less storm protection, they are less attractive to tourists and they no longer contribute to the formation of sandy beaches, which are in turn another protective barrier for coastlines and tourist attraction. Overfishing and pollution are serious immediate threats to many reefs; however, climate change is now the primary concern and will cause irreversible damage to reefs worldwide [3]. Crucial to the process of managing coral reefs is the incorporation of the human dimension into management at local, regional and international scale [4].



Why, When Where and How

“Museums are places of conservation, education, and about protecting something sacred. We need to assign those same values to our oceans.”

Jason deCaires Taylor

Award-winning sculptor Jason deCaires Taylor was commissioned by the Museum of Underwater Art (MOUA) to create a series of eight sculptures known as Ocean Sentinels, located at John Brewer Reef, Queensland, Australia (Figure 1).

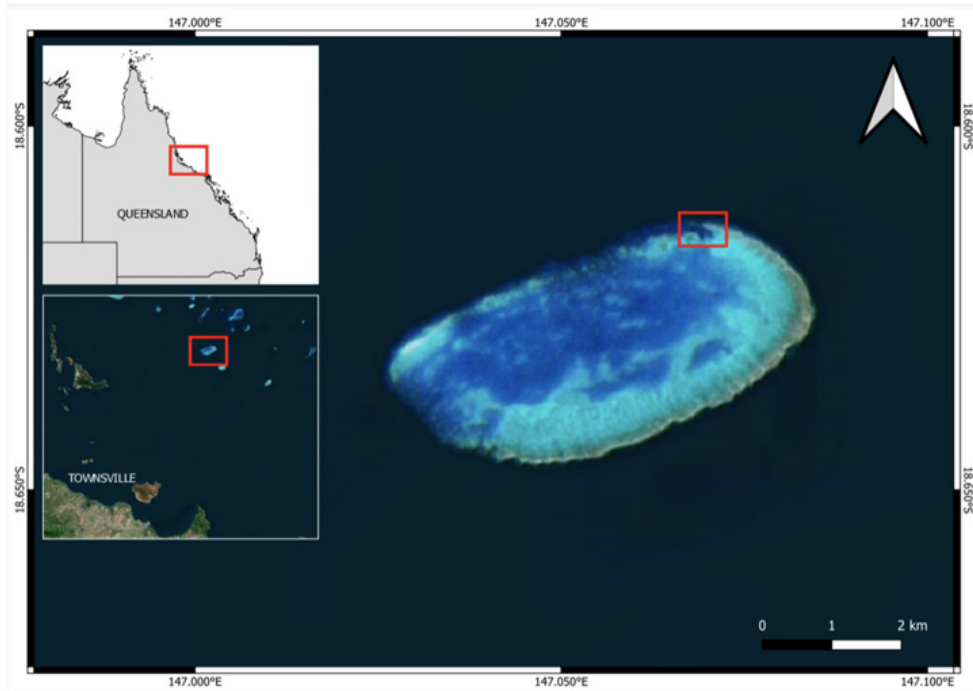


Figure 1: Map of John Brewer Reef in Townsville, Queensland, Australia. Ocean Sentinel and Museum of Underwater Art installation's location in red box.

Who are the Ocean Sentinels



Figure 2: Portraits of the Ocean Sentinels. Top row L-R: Professor John 'Charlie' Veron, Dr Katharina Fabricius, Dr Richard Braley, Sir Charles Maurice Yonge. Bottom L-R: Dr David Vaughan, Professor Peter Harrison, Molly Steer, Jayme Marshall.

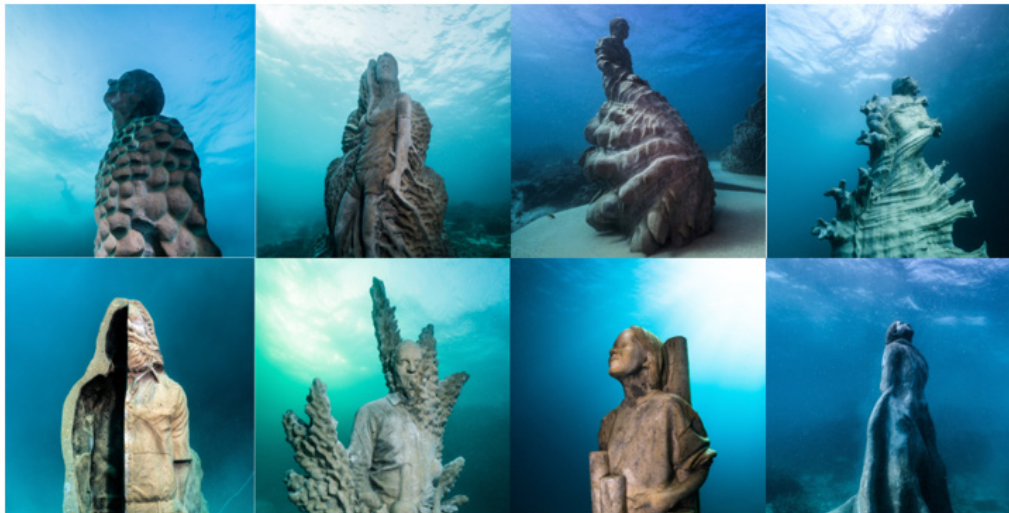


Figure 3: Underwater sculptures of the Ocean Sentinels. Top row L-R: Professor John 'Charlie' Veron, Dr Katharina Fabricius, Dr Richard Braley, Sir Charles Maurice Yonge. Bottom L-R: Dr David Vaughan, Professor Peter Harrison, Molly Steer, Jayme Marshall.

The Ocean Sentinels are made up of “the godfather of coral,” Charlie Veron, who has described 20% of all the corals on the planet, Professor Peter Harrison, the first person to record a mass coral spawning event in 1981, Jayme Marshall, representing the next generation of Indigenous leaders, Dr. David Vaughan, aqua culturist and pioneer of Plant a Million Corals, Giant Clam Man Dr. Richard Braley, Coral Ecologist Dr. Katharina Fabricius, marine zoologist, the late Sir Maurice Yonge, and school student Molly Steer, whose Straw No More movement to get people to stop using plastic straws has been adopted by 3000 schools (Figures 2&3).

Discussion

Underwater art installations can have positive and negative impacts on people. Underwater art is relatively recent and a popular way for people to explore, learn and be inspired by the marine environment, science, education, art, management, issues and solutions. Underwater art has a huge appeal and “wow” effect on locals, visitors and tourists [5]. Science communicators such as Jacques Cousteau, Silvia Earle and David Attenborough have inspired millions of science students to learn, work or behave as scientists or conservationists. It is essential to make a scientifically

based voice heard loud and clear, especially in times of crisis (epidemics, financial crisis, earthquake, new medications, etc.) and this can be done through professional communication [6]. Newlands et al. [7] found that there was no consistent voice and a narrative void for Great Barrier Reef water quality narratives.

We compared the communication reach of four of the individual Ocean Sentinel scientists, one artist and the Museum of Underwater Art (Table 1). The highest academic metric was 27,845 citations by Katharina Fabricius and the highest community metric was 90,049 on Instagram by Jason deCaires Taylor. Note the clear differences between scientists who have higher academic metrics and low to no community metrics and the artist Jason deCaires Taylor and MOUA who have high community metrics and low academic metrics (Table 1). Underwater art projects are generally very small, low impact, low risk facilities that have positive benefits on a variety of environmental, social, cultural and heritage values. Underwater art installations can have positive and negative impacts on marine plants and animals, increasing local biodiversity and providing convenient concentrations of marine life for observation by visitors [8].

Table 1: A comparison of two academic metrics (H-index, citations) and two community metrics (Facebook and LinkedIn) and an estimated global reach for scientists, artists and the organization associated with Ocean Sentinels. B- billion, M- million.

	Academic		Community		
	H-index	Citations	Facebook	Instagram	LinkedIn
John Veron	6	3996	3200	0	0
Peter Harrison	51	12607	656	0	47
Katharina Fabricius	75	27845	162	0	390
David Vaughan	?	230	25	1,965	3200
Jason deCaires Taylor	0	0	75,000	90,049	20
Museum of Underwater Art	0	0	8,200	9,964	535

Conclusion

We have estimated the direct size of the Museum of Underwater Art audience as 1.2M and measured the indirect audience as 184M per event. These are large numbers compared to the measured academic audience of individual scientists of between 245 to 28,000 over a lifetime. The magnitude between science and art is potentially 40 to 6,500 times the impact. There is a huge gap and opportunity for academics to share their science in collaboration with artists and social enterprises using innovative projects and communication tools such as mainstream media, Instagram and LinkedIn to reach new audiences.

Next Steps

The field of science, marine science and conservation needs ocean sentinels, heroes, and role models. They can provide inspiration, and hope in a world where it's easy to feel lost. A role model is proof that it's possible to achieve our dreams. They inspire us to become the best version of ourselves and to act against local and global problems such as climate change and ocean health. Scientists and artists must do things differently and prioritize storytelling to foster understanding, prompt action and behavior change on global issues such as climate change.

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