

The ISRS Education Committee

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Since its inception at the ICRS meeting in Hawaii this year, the Education Committee has been developing its membership and its priorities and proposals for the future. We have an exciting and dynamic membership, including Erinn Muller (ISRS Council member), Judith Mendes (Lecturer in Coral Reef Ecology, UWI), Tom Sparke (Education Program Manager, Little Cayman Research Centre), Paul Burke (Marine Science Teacher, Cayman Prep and High School), Dan Bayley (PhD student at University College London), working with the Zoological Society of London and the Natural History Museum), Sean Russell (Youth Program Director, Mote Marine Laboratory), Heather Page (PhD student, Scripps Institute of Oceanography), Archana Anand (PhD student, University of Hong Kong), and Adrienne Correa (BioSciences at Rice University, Ecology and Evolutionary Biology Program, Martel College Associate). We have also benefitted from the knowledge and experience of Rupert Ormond (Corresponding Secretary, ISRS) as occasional observer and advisor. With such a panoply of stars, as Chairman, I am definitely a 'guide on the side' rather than the 'sage on the stage'.

PROPOSALS

Our virtual discussions over email have produced the following proposals:

1. An **up-to-date database of ISRS members with a list of their individual expertise.**

Many members of the committee have excellent experience in promoting public awareness of coral reefs. ISRS should encourage this for all members. Although there is already a directory of ISRS members including their details and interests accessible from the membership page of the ISRS website, it is somewhat outdated. Having a one stop hub for reef education resources, lesson plans, public engagement activities, service project ideas etc. should both prove valuable to ISRS members and help broaden the reach of ISRS out to educators/students looking for these types of resources, all in one place. We need to revise the data fields to reflect up-to-date priorities of importance in education. These could include:

Have you produced written teaching materials?

Have you produced video/other media teaching materials?

Would you be willing to act as mentor in coral reef studies?

Have you done outreach to Schools/Colleges?

In addition, we anticipate having an "**education and outreach**" page and links on the ISRS website.

2. The need to **share educational materials.**

The need to share educational materials, such as leaflets and lectures, is an important feature in our Terms of Reference. Reef scientists do not have the time to re-invent wheels when preparing educational materials for their own projects, yet education has never been so critical. So far we have the following (in no particular order):

a. **Web sites:**

(i) Using some of the recent 'big' surveys on video, including –

Catlin Seaview (who are behind the underwater google street view). They have produced a series of curriculum resources based on their expeditions as well as media to use: <http://oceans.digitalexplorer.com/>

Tara oceans expedition was good for this too (<http://oceans.taraexpeditions.org/en/m/education/>) and made an effort to get school children to come and see the boat and the science they do at each port stop.

(ii) The Natural History Museum in London have an interactive virtual reality exhibit where you can dive with David Attenborough on the GBR http://www.nhm.ac.uk/visit/whats-on/programs/nhm/david_attenborough's_great_barrier_reef_dive.html Researchers to do in-the-field posts from various reefs they are working on around the world to inspire people, and to try show what people are doing more effectively.

(iii) The UK Marine Biological Society's Bioblitzes are really popular and make people feel involved with the science – see: <https://www.mba.ac.uk/learningzone/>

(iv) The National Oceanic and Atmospheric Administration office in Galveston, TX does an Ocean Discovery Day that has some great activities: <http://flowergarden.noaa.gov/newsevents/oddarticle.html>.

(v) The Khaled bin Sultan Living Oceans Foundation has launched a Coral Reef Ecology Curriculum, which is a comprehensive digital resource freely available online. It includes award-winning videos, custom-built interactive exercises, games, quizzes, and lesson plans for teachers — all aligned to the latest education standards (Next Generation Science Standards, Common Core State Standards, and Ocean Literacy Principles). The Coral Reef Ecology Curriculum can be found online at: www.lof.org/CoralReefCurriculum.

b. Educational lessons and materials

(i) Scripps Community Outreach for Public Education program -The lesson plans can be found at the following link:

<https://earthref.org/SCC/activities.htm>

Several of these lessons revolve around coral reefs and/or include reefs as examples of core concepts in biology.

(ii) Partially complete - The Caribbean Reef Education and Training Initiative (aka The CREATIVE Project) was funded by the EU's Edulink programme. The project, which was completed in 2013, developed undergraduate Coral Reef Ecology courses in five Caribbean countries: Jamaica, Barbados, and Trinidad (the three campus territories of The University of the West Indies), Belize (University of Belize), and The Bahamas (College of the Bahamas). The course at the College of the Bahamas was never implemented. The project also trained 10 teachers (two from each country to deliver the course). With respect to teaching material there remains an unpublished draft of a textbook to accompany the course (minus the geology section which was never written). What is currently available could form the basis of a complete Caribbean Coral Reef course.

(iii) 2-D Reef Replicas to convey concepts and methods in coral reef ecology and conservation, even in locations where we can't access reefs easily. Essentially, the 2-D Reef Replicas involve printing high-resolution mosaic images of coral reefs at 1:1 scale (aka life size) on an outdoor advertising banner (i.e., vinyl that you'd see on a billboard). Here is a little blurb about them: Young children to adults in public outreach or students in courses can use these to 'become' marine scientists when they use quadrats to quantify metrics of reef health, such as percent live coral cover, from the 2-D Reef Replicas. In outreach programs, teams working on different reef swaths can ultimately come together and 'scale-up' the data from their individual plots to examine variance across reefs and perform basic statistical analyses. As a culmination of these exercises, program participants can compare their results to Caribbean-wide reef statistics, and assess the health status and likely trajectory of the reefs they have examined. See: <https://www.youtube.com/watch?v=jeDjQp7IaIQ> Adrienne Correa at Rice University has some lessons for students to use with the 2-D Reef Replicas that she can share, and then students calculate the same metrics using a computer image analysis program (CPCe with excel extensions).

(iv) Tom Sparke can provide lessons for K-12 students on topics such as Caribbean fish ID, Caribbean coral ID, coral, seagrass and mangrove ecology, coral nurseries and also some very interactive workshops of lionfish management and ecotourism. All of the lessons have an interactive activity attached and he would gladly create them into succinct lesson plans for sharing with others.

(v) Sean Russell and Erinn Muller, with NSF support, have created a researched based afterschool programme for high school students in the Florida Keys and USVI. Details of the programme can be found at:

<https://mote.org/education/kids-families/research-based-after-school-program-for-students>

3. Collaboration with the ISRS Conservation Committee

We are in contact with the ISRS Conservation Committee, and the chairs met at the annual Reef Conservation UK (RCUK) meeting at the Zoological Society of London (ZSL) at the end of November 2016 to discuss further links. In particular, we anticipate collaboration over the proposal for a third International Year of the Reef (IYOR) to be held in 2018.



4. Cooperation with other organizations

Cooperation with other organizations should be encouraged. These could include Operation Wallacea, Blue Ventures, and Coral Cay. There is a global network of Youth Ocean Conservation Summit alumni. Using key events at zoos, aquariums, and museums, such as World Oceans Day celebrations, also provides an excellent opportunity to share coral conservation messaging and/or work to involve students in leadership roles teaching their peers about coral conservation and engaging them in conservation work. Also, the National Marine Educators Association and associated listservs/communication platforms have a wide reach to marine science educators working in both formal and informal settings around the world, making it an excellent avenue to share educational resources.

5. Possible Young Ambassador Award.

Applicants could be asked to create media as to how they could make or have made a difference to a country's reef or community. We could then explore the option of having the winner work at one of our organizations to gain work experience. A number of Programs have been identified that have helped elevate the outstanding work of many young conservationists over the years. Examples are: Brower Youth Awards (<http://www.broweryouthawards.org/>),

International Young Eco-Hero Awards (<http://actionfornature.org/eco-hero-awards/>) and SeaWorld & Busch Gardens Environmental Excellence Awards (<https://seaworldcares.com/en/2016/07/Celebrating-Young-Conservation-Leaders/>)

RECENT EXAMPLES OF EDUCATION AND OUTREACH

The committee has identified a number of recent examples of effective education and outreach activities that deserve mention here:

1. Sean Russell has been working with SeaWorld and Busch Gardens coordinating youth leadership programs, and directing the Youth Ocean Conservation Summit, an annual event held at Mote Marine Laboratory and replicated at aquariums/science centers across the U.S. This event trains students to launch conservation projects, and equips them with the funds/resources to ensure their success. See: www.yocs.org or <https://youtu.be/XoirNhQqjvw> and photo below.

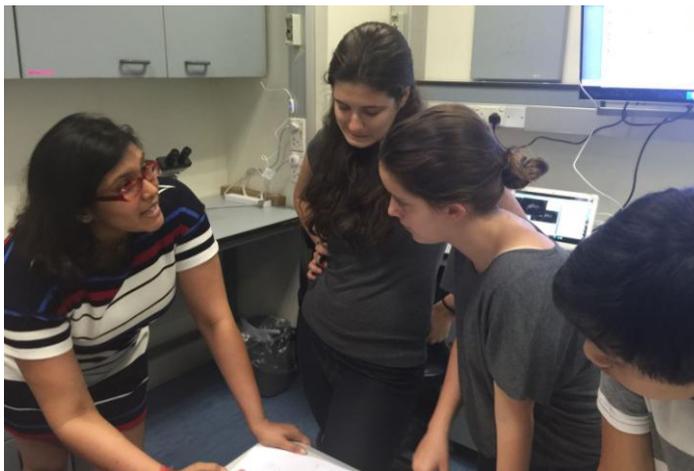


2. Ruth Gates' Laboratory has been very active in outreach activities. For example, in early September, PhD Candidate Christopher Wall completed a video in partnership with the STEM program at Nu'uauu Elementary School (Honolulu, HI) on marine biology and the ongoing research in the Gates Lab. The video has been shared with over 250 STEM educators in Hawaii and is available publicly at <https://vimeo.com/183601976>. Christopher and six other Gates Lab members taught 50 middle students and 12 chaperones from the School for Examining Essential Questions of Sustainability (SEEQS) in Honolulu, HI (see photos below). The students traveled to HIMB by boat to learn more about what coral is, the importance of coral reef ecosystems, the current threats to coral reefs, and solution-based science.

Gates' Lab research students are also active in the community. For example: Several Gates Lab students have signed up recently to participate in "Nerd Nite Honolulu". Nerd Nite is an international event where "nerds" share their interests in a casual atmosphere. In early September, PhD Candidate Beth Lenz discussed coral reproduction with about 50 individuals including high school teachers, tourists, and graduate students (see photo below). PhD Candidate Ariana Huffmyer traveled to American Samoa in August to present a Climate Science Teacher Institute workshop. This week-long workshop focused on climate science, the impacts of climate change on local communities, and how these concepts align with their curriculum and standards. And earlier this summer Ruth, along with an interdisciplinary team, produced an article about coral bleaching in the Scholastic Magazine, *Science World*, which is an educational magazine for students in grades 6-10 (see photo below).



- In June 2016 Archana Anand gave a talk to the Kai Tak Youth Rowing Club (KTYRC), a Hong Kong NGO aiming to teach rowing to economically underprivileged students between 12 and 14 years of age. Her talk educated them about Hong Kong waters, corals, sea life and how they can contribute to ocean conservation. She also shared a research project with the Hong Kong International School (HKIS), where students collect seawater samples and analyse them for *Enterococcus* (photo with students in class below with Archana on the left). Archana has also mentored a group of Hong Kong University students in macroalgae deployment for nitrogen isotope analysis (see images below).



- Finally I myself was at the New Scientist Live exhibition for the public at Excel, London, on September 25th talking with the public about ' "Why are coral reefs so important for everyone?' 30,000 People attended the event, organised by New Scientist magazine in conjunction with the Royal Society of Biology over 4 days. The photos below were taken in the relaxed few moments before the doors opened! I spoke to many of the participants, of all ages- even a small girl in a pram wanted to hold a *Siderastrea*! Many school age students wanted to do some sort of biology at university, and they were fascinated by the corals and their environmental problems. They also liked the dive profiles I showed them on my dive computer. They left enthusiastic and I hope with some useful knowledge.

These are but a few examples of the educational outreach activities being undertaken by members. We would very much welcome hearing from members about similar activities in which they have been involved, especially if there are examples which may be borrowed by, or materials shared with, the wider ISRS community, for example via a dedicated page on the ISRS website. In addition we would

welcome contact from those members who would be interested to join the committee or contribute to its work.

hibition



