# **CBCS** NEWS



A quarterly newsletter of the Centre for Biodiversity and Conservation Science Issue 2 Winter 2020 CREATE CHANGE

## 2020 Ocean Award in Innovation: CBCS leads win

CBCS Chief Investigator Dr Daniel Dunn has led the MiCO consortium to success in the **Innovation category** of the 2020 Ocean Awards.

The Blue Marine Foundation and BOAT International honoured MiCO with the award on 4 May 2020 in recognition of its contribution to innovative research that is helping ocean conservation.

MiCO, or the Migratory Connectivity in the Ocean System, is a consortium of data repositories, national observing systems, museums, environmental NGOs, universities, individuals, intergovernmental organisations and UN bodies that is delivering a sea change in how we access information on marine migratory species. The consortium's award-winning contribution is actionable knowledge to improve the conservation of migratory species of the world's oceans through an open, online system to aggregate knowledge of how more than 900 species use and connect our oceans. MiCO is supported by a grant from the International Climate Initiative of

### About CBCS

The Centre for Biodiversity and Conservation Science (CBCS) is a world-leading solution-oriented research centre for biodiversity conservation.

Based at The University of Queensland (UQ) in Brisbane, Australia, CBCS works in partnership with scientists, governments, non-governmental organisations and industry to help solve the most important conservation problems around the world.

CBCS has 21 Chief Investigators drawn from four UQ schools, 30 postdoctoral researchers and over 120 PhD students.

cbcs.centre.uq.edu.au

the German government to the Global Ocean Biodiversity Initiative (GOBI; **gobi.org**).

### From data to knowledge

Ocean basin-scale migrations of sea turtles, marine mammals, seabirds and fish expose them to multiple stressors and fragmented governance regimes. Sixty-three percent of assessed sea turtle subpopulations are listed as nearthreatened or threatened by the IUCN, as are 95% of albatross and 87% of assessed migratory shark species. Migratory fish, meanwhile, suffer twice the rate of overfishing if they cross jurisdictions. Lack of easily accessible knowledge on how migration connects areas of importance to these populations hinders the ability of managers and policy-makers to conduct meaningful environmental impact assessments and strategic environmental assessments, and to develop effective and efficient spatial management measures.

Together with Dr Autumn-Lynn Harrison of the Smithsonian Institution and 70 co-authors, Dr Dunn outlined the need for a step change in how we store and disseminate the knowledge derived from research on marine migratory species. Their paper The Importance of Migratory Connectivity to Global Ocean Policy, published by the Proceedings of the Royal Society in September 2019, laid bare the need for a new way of bridging the science-policy interface to improve outcomes for marine migratory species. To span that divide, MiCO focuses on standardising, storing and delivering knowledge rather than raw data. This approach both protects the currency of many researchers (i.e., the data) and decreases the capacity required to access and utilise research output.



Dr Daniel Dunn. Photo: IISD/Francis Dejon

While the amount of data describing migratory movements is growing exponentially, the results of these studies remain buried in the scientific literature and are only communicated via direct contact with the authors. This bottleneck in the delivery of critical ecological knowledge is a conservation tragedy, constraining efforts by managers, policymakers and industry.

### The future for MiCO

The novel approach of MiCO has already contributed to the work of the UN Food and Agriculture Organization, the UN Environment Programme, the International Seabed Authority, Regional Seas Organizations, and ongoing negotiations over a new high seas treaty. The Convention on Migratory Species also recently recommended the development of links between its Global Atlas of Animal Migration and the MiCO System.

CBCS will continue to provide leadership in delivering actionable knowledge to support the conservation of marine migratory species. The prototype MiCO System is set to fledge later this year with the addition of information from a massive literature review of 1200 papers.

To find out more, visit **mico.eco**.

#### Reference

Dunn, D.C. & Harrison, A.-L., *et al.* 2019. The importance of migratory connectivity to global ocean policy. Proc. R. Soc. B 286, 20191472. doi.org/10.1098/rspb.2019.1472

### **Protecting our oceans**

I love the ocean. When I'm not working on science to protect the ocean, I'm recreating in or near the sea. I lead **The Ocean Conservation Team** at The University of Queensland. My favourite projects are conducted in partnership with endusers, as this type of work often leads to conservation outcomes.

### Ridge to reef conservation science

My first foray into this field was as a young scientist, fresh out of undergrad. In 2000, I got a job in the Republic of Trinidad and Tobago with Environment Tobago, a small non-profit organisation dedicated to protecting Tobago's unique environment. I spent the better part of a summer determining how and where waste water (yes, sewage, yuck) impacts coral reef ecosystems in a small coastal village (pictured below). With virtually no experience in GIS, modelling or social surveys (I had a degree in Chemistry),

I miraculously created the region's first ever map of waste water and its impact on coral reefs. This was not the fancy sort of maps that we create now – it was a simple, hand drawn map that I made with the help of the local community.

After a stint as a high school mathematics and science teacher, I ended

up back where I started, working on integrated land-sea planning projects. I've been working with the Wildlife Conservation Society since 2010 to inform decisions about the location of marine and terrestrial protected areas in Fiji, that are considerate of how land-uses impact coral reefs. This time I use much more sophisticated approaches. drawing upon theory and tools from mathematics. economics and ecology.

also provide benefits to downstream

postdocs, I have built upon this work in

Fiji, partnering with other government

and non-government organisations to

interface to help protect coral reefs. For

example, we have worked with WCS in

Islands to assess the impacts of palm oil

that coral reefs can be heavily impacted

by these land-uses, even if best-practice

guidelines are followed.

and forestry on coral reefs. It turns out

Papua New Guinea and the Solomon

answer pressing questions at the land-sea

Carissa and her daughter at the UQ Heron Island research station. *Photo:* Travis Klein

Outcomes of our land-sea prioritisations were used to redefine priority forest Together with PhD students and

My favourite projects are conducted in partnership with end-users, as this type of work often leads to conservation outcomes. conservation areas, which were endorsed by the National Protected Areas Committee and National Environment Council. These prioritisations are used to help direct conservation investment into the most important sites in Fiji for achieving a representative network of terrestrial conservation areas that



Marine conservation at UQ As Deputy Director of CBCS, I'm really excited about fostering internal and external collaborations to help conserve the ocean. UQ has an incredible network of interdisciplinary scientists that together can solve some of the world's most pressing marine conservation problems. We also have two well-equipped marine research stations located in biodiversity epicentres (Moreton Bay and Heron Island)

Carissa spent time early in her career working with the community in Tobago (Caribbean) to protect their coral reefs. *Photos:* Carissa Klein

that can support our research.

# **NEWS IN BRIEF**

#### Families now welcome at UQ marine research stations

The University of Queensland has two marine research stations: **Moreton Bay** and **Heron Island**. Excitingly, families are now allowed to stay at the stations – an initiative that will certainly contribute towards supporting women in marine sciences at UQ. Visit their websites for more details about when COVID-19 closures will lift, and how to organise your next field trip or workshop. Not only are these fantastic bases for conducting field work, they have excellent workshop facilities for hosting conservation science meetings.

### Marxan makeover

Marxan, the world's most popular tool for creating systems of marine protected areas, is having a makeover. A new **website** includes a growing number of links to case studies – many created by CBCS people, for example, Vanessa Adams et al. on **Land-Sea Planning in PNG** and Maria Beger et al. on **Conservation Planning in the Coral Triangle**. In July 2020, a new, easy-to-use web-based version of Marxan will become available for training, with more exciting updates on the way for ocean conservation and more: **Jennifer.Mcgowan@TNC.ORG**.

### Belt and Road's financiers fall short on biodiversity, find CBCS researchers

In a new paper published in *Nature Sustainability*, CBCS researchers Divya Narain and Professor Martine Maron examine biodiversity safeguards of the Belt and Road Initiative and find that very few financiers of the ambitious China-led infrastructure development program have mitigation measures in place, even as it potentially impacts 150,000 km<sup>2</sup> of critical habitat. Read the paper here.

### CBCS co-leads worldwide collaboration on sea turtle conservation

Increasing threats to marine and coastal environments have led to declines in most threatened sea turtle species. To help prioritise action for sea turtle conservation, CBCS Professor Salit Kark and Professor Noam Levin convened an international workshop on sea turtles in Jerusalem in November 2019, "Advancing global conservation planning for sea turtles that incorporates night lights and other threats". Global collaboration on this topic is continuing in 2020, with the team developing work to identify threats to coastal environments and mapping sea turtle nesting beaches globally. This collaboration involves colleagues from India, the US, the UK, Australia and elsewhere around the world.

A green turtle at Heron Island. Photo: Salit Kark





Daintree mangroves. Photo: Ruth Reef

### What datasets are available to support mangrove conservation and restoration?

Mangroves are ecosystems that provide a multitude of ecosystem services, including those that support community livelihoods, climate change mitigation and adaptation. Professor Cath Lovelock has contributed to a *One Earth* paper summarising the growing number of global data sets to support conservation and restoration of mangroves. They highlight the importance of the Global Mangrove Alliance and future challenges which include incorporating socioeconomic data and real-time monitoring. Read the paper **here**.

### Safeguarding Earth's marine species

A new One Earth paper led by Kendall Jones, with CBCS and other collaborators, demonstrates the scale of action required for future global conservation to preserve marine biodiversity: at least 8.5 million km<sup>2</sup> and 26% of the ocean. Read the paper **here**.



Deep sea life. Photo: NOAA

#### CBCS finds the deep ocean is warming

In a *Nature Climate Change* article, Isaac Brito-Morales and co-authors found that the deep ocean faces rapidly accelerating threats from ocean warming by 2100, irrespective of the greenhouse gas mitigation pathway society follows. We explored ocean warming at different depths, suggesting how fast species at each depth might need to move to remain in their present climate (climate velocity). Climate velocity is presently faster at the surface than in deeper water but under future scenarios, deep-ocean layers have much faster climate velocities. Read the paper **here**.

### **Estimating African lion populations**

African lions are thought to be declining across the majority of African protected areas; however, robust estimates of their populations remain rare. In two papers published in May 2020, Alex Braczkowski and CBCS co-authors: 1) show that in 169 studies on lion numbers, only two used robust census methods that incorporated spatial information and individual lion identities (this is inherently dangerous for recovery planning and triage of the species populations); and 2) show a way forward by applying a recent SECR method to a rare tree-climbing population of lions in Uganda. Not only are lion numbers in this region low, but their movements have increased over time. Read the first paper here.

Caitie at work on a Reef Life Survey at the Fredrick Central Reef in the Coral Sea. *Photo:* Graham Edgar



Cuba, Fiji, Tanzania, Solomon Islands and Madagascar) that have reefs identified as being relatively less vulnerable to climate change and with higher chances of repopulating other reefs in the future. Based on a strong collaborative effort (WWF, WCS, Rare, CARE, Blue Ventures, UQ, the Fiji and Indonesian governments and Vulcan Inc.), CRRI aims to better protect and manage these reefs while strengthening community resilience through diversified skills and livelihood opportunities in the face of a rapidly changing climate. As the program develops, our goal is to build a collaborative research network at UQ to help find innovative solutions to imminent challenges facing these communities and associated reefs.

I am excited to be back at UQ to work on this strategic project and encourage anyone with interests or expertise relevant to CRRI to reach out to me for further discussion.

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### Finding solutions for coral reefs

How'd a girl from Iowa end up doing marine biology in Australia?" is a question I frequently hear when I introduce myself. I have always been fascinated by the ocean and, despite growing up in the middle of the United States, I was surprisingly surrounded by coral reefs – from the Devonian nearly 380 million years ago.

As I was far from any modern-day oceans, my first research experience during my undergraduate degree in environmental science explored speciation in *Diploria* coral fossils – a type of brain coral found in the Caribbean. This involved spending many hours in a geology lab making coral thin sections and carefully measuring the dimensions of the features of each sample. While interesting, lab work and I were not meant to be. I took a summer field course in

Friday Harbor, Washington, where I spent three months immersed in the marine environment. There was no looking back.

#### From ecology to conservation

My Masters research analysed herbivore dynamics on coral reefs off of the Caribbean coast of Panama – coincidentally where the fossil corals from my undergraduate research were collected. I loved being in the water, but during this time my love for the ocean shifted towards wanting to make sure it was protected and effectively managed into the future. I sought out PhD opportunities in conservation and secured a fellowship at The University of Queensland (UQ). With the support of great mentors and colleagues, I gained invaluable experience across many scales of spatial planning – from measuring progress towards international policies to on-the-ground prioritisation exercises in Indonesia and Papua New Guinea.

A subsequent postdoc at the National Center for Ecological Analysis and

I love doing research to better quantify and understand how humans impact our environment. Synthesis, back in the US, allowed me to strengthen my data and open science skillsets while tackling pressing challenges related to food production and the environment. It became clear to me that I love doing research to better quantify and understand how humans impact our environment and

to help identify efficient solutions for both nature and people in this changing world.

#### Managing reefs for the future

In my current role, I am lucky to combine these passions. I am working with UQ and the World Wide Fund for nature (WWF) to develop the research agenda and management and evaluation framework for the **Coral Reef Rescue Initiative** (CRRI). CRRI works across seven countries (Indonesia, the Philippines,