



# Harbouring a Sludge

*Dr Emma Johnston is dedicated to identifying, preserving, and enhancing the biological systems of Sydney Harbour. She talks to Lee Suckling about what this means and why Sydneysiders should pay attention.*

**T**hough born and raised in Melbourne, Dr Emma Johnston fell in love with Sydney when she found academic employment here ten years ago. “I grew up in [Victorian seaside suburb] Williamstown: swimming, sailing, and badly attempting to surf,” says Dr Johnston.

“After doing my PhD in Melbourne I was lucky enough to land my first job at University of New South Wales and was completely blown away by Sydney; it’s framed by the natural beauty of the harbour. There’s this rivalry between Sydney and Melbourne – and which is most beautiful – but Sydney wins hands down because of the harbour.”

A specialist in human impacts in marine systems and biological diversity, Dr. Johnston, an Australian Research Fellow at UNSW, is inaugural Director of Sydney Institute of Marine Science’s *Sydney Harbour Research Program*. Armed with 35 researchers, this five-year project, which has a budget of at least \$10 million, is led by Dr Johnston to uncover the high ecosystem and conservation value of the harbour.

“The Sydney Harbour means very positive things to us,” Dr Johnston says, noting the harbour’s ‘Zen relaxation’ properties. “It’s part of our identity; with it we have a shared connection. But when we’re not directly swimming, sailing or walking around it, we can take the harbour for granted. A lot of time and effort goes into ensuring it’s not a great big stinking mess.”

Dr Johnston notes “About 74 pieces of legislation” pertain to the harbour, alongside dozens of agencies and organisations - from the Environmental Protection Authority to Sydney Water - and thousands of people who make it their job to keep the harbour bright and blue. “It’s not really common knowledge that Sydney Harbour has a legacy of contamination issues,” says Dr. Johnston. “Things improved dramatically in the 1970s with EPA’s initiatives to license pollution and move sewage out, but we still have around 900 sewage leaks every year.”

Understanding and assessing contamination is just one part of the research framework around the *Sydney Harbour Research Program*. “We have three major goals,” Dr. Johnston explains. “The first is to identify the biodiversity in the harbour – the species, the habitats, the ecological systems – and work out what underpins them, and why we still have them,” she says. “For example, there’s a world record of fish species in the harbour - 578 when last counted. But why are these fish attracted to our waters?”

“From a biological perspective, much of what’s in the harbour has been there for thousands of years. Whatever is in there is really special, and represents inherent biological diversity.”

The first 18 months (to date) of the program has focused on this identification objective - identification of not just what is in the harbour, but how it is used. “No one had really documented what people were doing on the harbour,” says Dr. Johnston. “We’ve had

people out on boats for the last 40 days with binoculars, observing how the harbour is used. There are 40,000 recreational boats out there, and a huge number of Sydneysiders are recreational fishers. Understanding what they do, and how it affects the harbour, is important to the program.”

Subsequently, Dr. Johnston’s program aims to identify the threats to the harbour “to deliver a risk assessment, which involves contamination and biological information, to ensure we know what threatens our harbour”.

“If we completely destroy those things that have been in the harbour for thousands of years, we can never get them back.”

The final major component is a focus on public outreach. “This will encompass corporations, philanthropic institutions, schools and the community at large,” says Dr. Johnston. “Because the research will cover the whole extent of the harbour, right up to Parramatta and beyond and the whole of Middle Harbour, we aim to engage a very broad cross-section of the community throughout the whole of Sydney.

“There are lots of ways we can minimise risk on a personal level. Everyone plays a part in the preservation of the harbour.”

Keeping litter off the ground and dry-docking of boats for cleaning (ensuring potentially contaminated run-off doesn’t go into the harbour) are some of the things individuals will be encouraged to do through public outreach. “This leads to educating people about the social value of the harbour: as humans, what we get out of it, and how this would change if it was a smelly green mess,” says Dr. Johnston.

In order to enhance the harbour, the *Sydney Harbour Research Program* aims to restore some of the lost biological diversity. “Fifty percent of our sea grass has been lost, as has 85 percent of our salt marsh,” Dr. Johnston explains. “These are difficult to resuscitate, but restoration can be done.” Such diverse and productive ecosystems play a large role in the aquatic food web and in the recycling of nutrients in coastal waters.

It’s not all valuable ecosystems, tropical fish species and yachts in Sydney Harbour; there are some hidden nasties in our waters too. “There are a few dirty secrets of Sydney

Harbour,” says Dr. Johnston. “One of the potential surprises is the number of pharmaceutical products that pass through humans, down the toilet, into sewerage, and then become toxic sediments in the ocean. This is owing to people taking more and more pharmaceutical medicines.

“They bind to very small particles of mud and organic matter and then settle into the sediment. From an ecotoxicology perspective, they’re an emerging contaminant that we don’t know much about ... but they’re adding to Sydney’s contamination legacy.

“But don’t get too depressed. In was a lot worse in the 1970s. There was carnage. Places were called ‘abiotic’ [the biological term that means nonliving or not alive]; you couldn’t swim in a lot of places. Water quality has really improved since then, [but] I think we can do more and we just need to get the political will and the resources to fund some of the cleanups that need to take place.”

The program’s public outreach and research ensures collaboration with major policy influencers within government, which should therefore entice the aforementioned political dedication. “We’re not simply presenting our data to political people at the end of the program and hoping they do something with it,” says Dr. Johnston.

“We’re involving them from the beginning and ensuring all data is accessible via central databases (which will also become publicly available). This will ensure maximum use of data for policy decisions and education. Because it’s useful immediately, it can influence immediately.”

Part of the reason Sydney Harbour is so biologically diverse is because the area is so environmentally diverse. “The depths, the sediments, the flushing, all make space for different habitats ... these things mean that almost every marine habitat in existence can survive and thrive in Sydney’s waters (with exception of some deep sea habitats),” says Dr. Johnston.

“We need to ensure we know what these habitats need, so we can avoid homogenising the whole place. Sydney Harbour is unique and varied and we want to keep it that way.” ■

