

THE WIOMSA MAGAZINE

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people & the environment

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inside...

The Women in Marine Science Network (WiMS) has inspired this special edition.

Stories from women who are making a difference in coastal and marine resource management.





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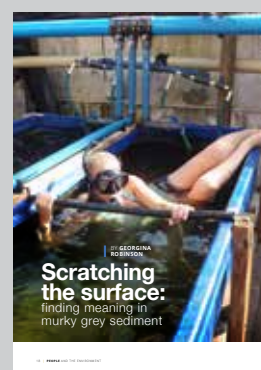
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Cover photo: *Nyawira Muthiga* doing a coral reef survey at Mitsio, North West Madagascar & *Josheena Naggea* with a fisherman on the opening day of the first seasonal octopus closure in Mauritius. © Sydney Perrine.

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people & the environment

Breaking the class ceiling: **stories from women who are making a difference** in coastal and marine resource management. **The Women in Marine Science Network (WiMS) has inspired the release of two special editions of the WIOMSA Magazine** featuring the stories of women working in the marine and coastal field in the Western Indian Ocean region and beyond. **Part I of this series contains 14 articles.**



A golden thread

BY CLAIRE WARD



There's a golden thread running through this wonderful collection of stories. It's a thread that mysteriously connects a social scientist conducting research among fishing communities in Indonesia, to the daughter of illiterate farmers who becomes a university professor in Mauritius; it is a thread that binds a young Malagasy conservationist with a fascination with marine megafauna, to a community researcher helping and encouraging Zanzibaris to culture seaweed for food and livelihoods.

At first, the golden thread is difficult to see. What is it that these women share, that brings them together in a community that stretches across and beyond the vast Western Indian Ocean region? Is it courage? Definitely. Is it hard work? Undoubtedly. But there is something else woven into the thread that connects these stories. Perhaps the right word for it is "inspiration".

Jacqueline Uku, President of WIOMSA tugs at the golden thread when she says "I aspired to the position simply because my mentor Nyawira had shown me that it was possible to become the leader of the WIOMSA Board. She demystified the leadership role and made it real and possible and this gave me the courage to try."

Josheena Naggea a doctoral student working in coastal communities in her home country of Mauritius invokes the spirit of the golden thread when she writes, "I could not forget an appeal made by Dr Phoebe Barnard, presently the Chief Science and Policy Officer at

the Conservation Biology Institute, who had worked in Africa extensively. At the Tropical Biology Association field course in Tanzania in 2014, Dr Barnard, who was a mentor on the course, stressed the fact that Africa needs its scientists to come home and help support conservation efforts!"

In each of the stories that have been contributed to this special edition of the WIOMSA magazine, women working in unusual jobs and sometimes in difficult circumstances – living and studying through bitterly cold winters in a foreign country or shouldering the responsibility of single parenthood – draw inspiration and resolve from the women around them. In some cases, inspiration comes from a female university professor who opens the writer's eyes to the possibilities that exist in the field of marine science; in other cases it is a female network that provides support and practical help to a young woman in a tough new job. In one case, it is a colleague who agrees to write a story on behalf of a woman who has just given birth.

As you read the stories, you will realise that the surreptitious golden thread that winds through these marvellous tales of determination and passion goes in two different directions: just as the women draw inspiration and strength from the women who went before them, so they are passing on lessons and providing support to those who follow.

"If you ever find yourself feeling the giddy fear in your stomach before your first

dive, the terrifying fear before handing in a resignation letter, or the daunting fear of planning to change the face of your industry – jump. Sign. Lead. Some of the best experiences are waiting for you on the other side of convention." These breath-taking words of advice are passed on by Heba Hashmi, a maritime archeologist with a dream of uncovering the lost port of Debal in the Indus Delta in Pakistan. They are echoed by Angelique Pouponneau, an environmental lawyer and Chief Executive Officer of the Seychelles Conservation and Climate Adaptation Trust who writes: "My advice to women planning to pursue careers in marine science or coastal management is not to be intimidated by the title of a position or the usual faces that you see in a space, but dare to succeed. And you cannot succeed if you do not apply for the job!"

If you've ever wondered why a network of Women in Marine Science is necessary or appropriate, read the stories in this magazine and learn about the subtle ways in which the support and collaboration of women is helping academics, community researchers and conservation leaders working throughout the Western Indian Ocean to overcome some of the cultural and systemic hurdles that make it more difficult than it is for men to advance in their careers. And, **as you read about the splendid work that women marine scientists are doing in the Western Indian Ocean, you are very likely to find yourself tugging on that golden thread of inspiration.**

The last time we met

BY JACQUELINE UKU

“

The last time we met, I did not have white hair – now it is beginning to fill my head and I wonder if it is a reflection of wisdom.”



I tell my mentor, Dr Nyawira Muthiga, as I sit down for our mentoring session.

It has been a while since we last met and we have been meeting monthly since I moved to Mombasa to work in 1997. We catch up on family issues and talk science and reflect on the choices we have had to make in life. What starts out as an hour-long meeting often stretches until we have run out of things to say. Then we pack up our hearts and return to our special calling, feeling refreshed because we made the time to connect.

My friends like to call me Madam President, and I go by many names, depending on the role I am playing. The name my parents gave me is Jacqueline Uku and in 2014 I achieved something that I had long aspired to: I was elected President of the Western Indian Ocean Marine Science Association. I aspired to the position simply

because my mentor Nyawira had shown me that it was possible to become the leader of the WIOMSA Board. She demystified the leadership role and made it real and possible and this gave me the courage to try.

My journey to becoming the President of WIOMSA began with the choice I made during my master's degree in 1992 – to take on a subject that was not explored very much at the time. I was doing a course in Biology of Conservation and traditionally students took up projects in wildlife management and terrestrial conservation. I was fascinated by the sea after participating in practical field sessions in intertidal areas during my undergraduate training. So I chose the sea, and in particular I chose to work on the seagrasses of Diani on the south coast of Kenya. I felt that marine conservation

Dr. Jacqueline Uku, President of WIOMSA, and senior Research Scientist at Kenya Marine and Fisheries Research Institute.

was not a big focus and there was need to highlight issues of the sea by undertaking a project in the marine sector rather than the terrestrial sector. There was resistance at first within the Department because marine issues were considered the domain of training in Aquatic Ecology, but my proposal was eventually accepted and I ended up working at the **Kenya Marine and Fisheries Research Institute (KMFRI)**, using the lab space to analyse my samples. One day an opportunity came up and I applied for a job at KMFRI. I became a staff member of the institution in 1994.

“ My vision was to put Kenyan seagrasses on the world map and I engaged in creating a team of seagrass enthusiasts which has grown into a community of seagrass scientists.

My journey as a researcher in KMFRI can best be described through the different roles and offices that I occupied. The glass ceiling is often seen as a transition to the topmost echelons of leadership, and usually as a transition to the top floor – where the top managers of institutions tend to work. For me, the glass ceiling has been in the personal barriers that I have had to break to grow into a leader in the field of marine and coastal sciences.

Soon after my employment at KMFRI, I came into contact with WIOMSA through a bilateral programme led by the late Adelida Semesi. The aim of the programme was to develop capacity in the study of macrophytes, in particular seaweeds, which were being

I found myself transforming into a plant physiologist. I graduated in 2005, and returned to KMFRI. One thing that became very clear to me is that PhD graduates in our system quickly become administrators of science and sometimes have very little time to devote to pure research. I too was assigned administrative duties, such as handling the KMFRI performance contracting process and handling pension issues as a member of the Pension Board of Trustees. My objective with these two responsibilities was to set up a framework and system which could be taken up by those who came after me.

Before long **I was requested by the then Director of KMFRI, Dr Kazungu, to take up the role of developing the**



Out at sea- seagrass monitoring.

farmed in Tanzania in the 1990s. This led to my interaction with a team from Sweden and I became a PhD student of Professor Mats Bjork. **My studies opened my seagrass world to new techniques and applications in plant physiology. From a field ecologist,**

World Bank-funded Kenya Coastal Development Project (KCDP). I hesitated because I knew that the request meant that I would have to sacrifice my research role yet again.

Below: Dr. Uku at the launch of the Nansen Western Indian Ocean Book, Dar es Salaam Tanzania

My seagrass team members were spreading their wings in search of new opportunities and so after much thought I took up the role of coordinating KCDP.

For seven years, I worked to coordinate the seven implementing agencies to deliver on project targets. In this new role, I had to create work teams to deliver on institutional targets and work with high-level government committees to ensure the adoption of products from the project. Today, I look back with a great deal of pride at the achievements of the KCDP. These range from institutional infrastructure to training of students. Infrastructure developed through the project includes the extension of the Marine and Ocean Services Center at KMFRI, the Monitoring and Surveillance Center for the State Department for Fisheries, the Farmers Resource Center for KEFRI in Lamu and the NEMA Green Point in Lamu. Other investments include the tourism jetty in Shimoni and modification of the access route to Sheldrick Falls in the Shimba Hills National Reserve. Over 200 community livelihood and infrastructure grants were provided through a programme known as *Hazina Ya Maendelo Ya Pwani*. These small grants made a significant impact on coastal communities, particularly in the area of infrastructure development such as the development of the Kaya Kinondo Village Bank, the Mutakuja Adult education center, Mwanagea Hills Green Belt project in Voi for disabled children, among many others. Coastal students

were supported through a scholarship fund at certificate, graduate and post graduate levels and today many of the project grantees are serving in director positions in Kenya's six coastal counties.

The KCDP closed in 2017 and I began a new journey back to my research roots. My small team of seagrass champions were still there and it was easy to reconnect and re-start the journey. My team members were finishing their own personal journeys and ready to create new adventures in the field. One such adventure is to teach to children about the marine and coastal environment. It all began when, as a team, we decided to

dedicate their lives to conserving the ocean and its diverse habitats.

“ I have always followed my heart and it was humbling to be singled out by IOC- UNESCO to be a recipient of the 2019 NK Panikkar Award.

It meant that, although I had taken a long and often windy road, my work and my efforts have made a difference to many people. My journey has not



set up a children's corner at the annual Agricultural Society of Kenya Show in Mombasa in August 2019. We adapted material from the Australian-based Seagrass Watch team and used this to set up a corner where children could learn, using crosswords and mazes, and also have an opportunity to color pictures. We have since gone on to use these tools to host children at KMFRI. This new adventure is just beginning and it has the power to live on after us, empowering the next generation of researchers and marine enthusiasts to

been without its challenges but I tend to focus on the successes and see the challenges as opportunities that came my way, helping me to break a personal barrier and refine my path. **Leading as a woman in a male dominated field will always have its challenges and it takes time for a woman to be given permission to lead; this calls for patience and perseverance.** There is a need to rely on instinct and to develop a firm inner spirit to be able to bear the challenges.



Women need to step into the leadership role and take part in the regional dialogues that will define our marine and coastal areas and safeguard them for future generations.

Above: Dr. Uku with dignitaries at the 10th WIOMSA Symposium in Tanzania. **Left:** Jacqueline Uku with members of the WIOMSA Board and members at the 9th WIOMSA Scientific Symposium, South Africa. **Right:** Dr. Uku at the launch of the Nansen Western Indian Ocean Book, Dar es Salaam Tanzania. **Below:** Dr. Uku's accepting the 2019 NK Panikkar Memorial Award medal from the chair of the KMFRI Board of Management Hon. John Safari Mumba and the Director of KMFRI, Prof. James Njiru.



There is a critical need to grow, mentor and nurture leaders, both men and women, who are part of our teams so that they have enough confidence to step into our shoes when we are gone. It is important to be part of a team, to learn to delegate, to learn to work with those who are more talented than you are, to seek a good mentor because with these things the journey becomes much easier. It is important to develop the ability to reflect and develop new strategies from this. It is also important to cultivate a thankful spirit for it is in thankfulness that God reaches out to you and propels you forward.

I remain thankful to those who have made my journey worthwhile. I am thankful to the great teachers who helped me move from being a silent note-taker at the back of the room, to sitting at the head of the table, finding my voice and contributing to issues that are important to the WIO region. I remain thankful to my family – my mother, sisters, husband and son – for enabling me to do the things that have made my heart sing. I remain thankful to Dr Julius Francis for championing me from the early 1990s to date.

I believe that I have broken my glass ceiling and will continue to aspire to touch the lives of the youth as my hair continues to turn white.



Women

BY SARAH FREED ON
BEHALF OF **FATIMA OUSSeni**

are ready for change!



Fatima Ousseni is a practitioner in coastal and marine resource conservation, focusing on governance and community engagement. She also conducts social science research to understand community members' barriers and opportunities for participating in marine resource governance. Fatima started her career as an agricultural technician before entering the field of marine conservation.

“ I think it is important to find methods that better engage women fishers as well as their communities in marine resource management, because without them management cannot be effective.”

I had the privilege of working with Fatima for two years at the Comorian non-governmental organization, [Dahari](#). I recently spoke with Fatima and she was enthusiastic about sharing her experience in the WIOMSA magazine. She asked me to write on her behalf because she is one month into her role as a new mother.

At Fatima's request, this article focuses on the women fishers she works with. She is committed to making their voices heard, and her reason for this is clear:

Our work at Dahari began four years ago with the objective of establishing the first community-based marine management initiative in Anjouan, Comoros. Quickly recognizing the need to include the many women fishers who had never previously been included in fisheries or other management initiatives, Fatima befriended a few women fishers and began to earn their trust. She

mentored our field team in working with fishers through an inclusive approach to catch monitoring, which led to community discussions on the status of coastal resources and avenues for management. As fisher interest in marine management grew, we were able to take **three fishers, two women and one man, on a learning exchange to witness community-based marine management in Madagascar.**

Fatima then went on to lead an exchange in Zanzibar where women fishers learned about temporary closure of the octopus fishery.

These efforts led to the successful temporary closure of the octopus fishery – the first of its kind in Anjouan, and to the development of [Maecha Bora](#), an organization to formalize the collaborative initiatives of fisher women for marine resource management.

Some of the organization's latest activities have included work on



Left: Candidates for the Maisha Bora Election speak. **Above:** Fatima during agricultural days.

processing catch to improve storability and value in local markets. **The fortitude and commitment of the women involved in the organization, the first of its kind in Anjouan, is demonstrated against the backdrop of continued political and social conflict, from community to national scales.**

Fatima is an Anjouan native and feels strongly about her calling to help her fellow islanders. She continues to work in and alongside the communities, finding ways to overcome the many political and socio-economic challenges to marine resource conservation and governance within the Comoros. While even the smallest of these challenges **would seem insurmountable to most, Fatima maintains her hope and courage, and most importantly**

her ethics of empowering those who rarely have agency in political and marine management decision-making.

I encourage young women starting a career in coastal and marine resource management to take note of Fatima's strengths that have shaped her own career journey. Her courage and perseverance have helped her to achieve her goals when faced with a challenging context and personal health struggles, including a field injury from her agriculture days.

Her sociability and commitment to serve communities have fostered rewarding partnerships with remarkable outcomes for the communities, even under challenging circumstances.



Fatima's advice, especially for women in the Comoros is:

“ I encourage you to choose this career path. I am seeing that when women lead, people listen and engage and are ready for change!”



Top: Fisher woman. **Middle:** Fisherwomen. **Bottom Left:** Fatima Interviewing fisherman. **Bottom Right:** Fatima (right) during the Madagascar learning exchange.



At first it was not easy

BY **FLOWER MSUYA**

Flower Msuya (centre in gold top) during a training on making seaweed products

“

I am Flower Ezekiel Msuya, a marine biologist working as a researcher in marine science. My research work focuses on seaweed farming and integrating seaweed with marine animals such as fish, shellfish and sea cucumbers. In the course of my work I also conduct research on women in seaweed farming, health issues and the impact of climate change.

“ I am the chairperson and facilitator of the Zanzibar Seaweed Cluster Initiative (ZaSCI – www.zasci.webs.com), an organization through which I started seaweed value addition by making the first ever seaweed products to be produced in Tanzania (grown by a seaweed farmer who I trained). The first products made in 2006 were seaweed powder, seaweed soap and seaweed body cream. I am a woman scientist with a dream to see innovative and competitive seaweed farming and seaweed products produced and sold in East Africa, Africa and the world.

Inspiration

My inspiration to be a marine scientist started when I was taking my undergraduate degree. I took a course in the study of seaweeds. Looking at plants growing in the sea, as opposed to the plants I grew up with in my mother's farm in Ugweno, Kilimanjaro, I wanted to learn more about these plants. **And when I started working with these plants, at the time when I was starting my career, I realized that women in Tanzania cultivate these plants; I immediately felt that I should base my research on helping farmers (most of whom are women) to improve their livelihood.** Therefore, I did my PhD on integrated seaweed farming and continued working as a researcher in the field of marine science.

Today we have 25 groups of farmers and producers of seaweed products who actually eat seaweed at home. This is very inspiring for me – to know that I have changed people's mindsets and culture in a positive way. Coupled with this is that when I started to promote the ZaSCI not many people in the government even wanted to listen to me or help with starting it. But now I see lots of interest in the government to promote seaweed value addition. If I had not volunteered and persisted with this, I believe that we would not have the value addition situation that we have now. I am very proud for making this happen in my country. Equally, I, in ZaSCI, spearheaded the start and continuation of the ZaSCI Seaweed Day celebrations that have been held on 23 July, every year since 2016.

Challenges as a woman

The challenge as a woman comes especially when you are from a different religion and/or culture and you want to work in a community development activity like seaweed farming, in a culture that is different to your own. At first it was not easy, but as time passed, I got used to it and so did the people of Zanzibar. **When I was introducing the use of seaweed I was not taken seriously and I felt alone, but I did not give up.** In most cases I did not get any support because no one knew about using seaweed and I was introducing a “strange” thing. When introducing the use of seaweed, especially seaweed as food, being a woman from a different culture telling a man from this culture to eat seaweed was not easy. I got comments like *“why should I eat seaweed? As if I do not have food!”*

I am currently faced with the challenge of looking for ways of coping with the effects of climate change on marine resources, and the marine environment in general. The increase in sea surface temperature is killing peoples' lucrative seaweed farming activity. Farmed seaweed dies when temperatures are high, especially during the hot season (December to February) when water temperatures rise above 32 °C. I am trying to develop farming technologies that may be used in deeper water, where waters are much cooler, but the technologies are yet to be perfected because the sea is rough. This is my challenge as a marine scientist and I will continue working to develop improved technology so that our farmers can continue to enjoy the fruits of their efforts in seaweed farming.





“ The most inspiring experience I have had is recalling the time that I introduced the ZaSCI to Zanzibar. At the time, no one understood the idea of using seaweed to produce products, not even the government understood!



Advice to young scholars

“ My advice to young women marine researchers and resource management scientists is that “they can”. They should “dare” and move forward with a go-go-go attitude and not succumb to those who want to pull them down.

They should not succumb to sentences like “she is a woman, she cannot” or “the marine environment is a man’s world”. Our marine resources are a valuable resource, it is our responsibility to take care of them, research and guide their use in the optimum way. This will help our environment, our people, and ourselves.

Above: Flower on a seaweed farm. **Above Inset:** Seaweed products. **Left middle:** A bunch of seaweed *Spinosum*. **Bottom left:** Seaweed farm.

Apply for the job!

BY ANGELIQUE
POUPONNEAU |



“

I'm not quite sure how I ended up where I am today, but I have always wanted to give a voice to those who could not stand up or speak up for themselves. My name is Angelique Pouponneau, 29, an environmental lawyer from the Seychelles. I am the Chief Executive Officer (CEO) of the Seychelles' Conservation and Climate Adaptation Trust (SeyCCAT), a fund capitalized by the proceeds of the Seychelles debt-for-nature swap and its sovereign blue bond.



Above top: Angelique providing a grant to Shahiid Melanie's project to develop an app to get fish from route to market. **Above bottom:** Angelique assisting with the surgery required for the insertion of the tag in the sickle fin lemon shark in GVI's project that seeks to assess the effectiveness of the Curieuse Marine National Park.

joined the legal profession with a view of becoming a human rights lawyer, but during my time as a practicing attorney-at-law I started a youth-led, non-governmental organization with the aim of advancing sustainable development through youth-led projects. I realized my passion lay with the global commons (the ocean and the atmosphere) and I became an advocate for the sustainable management of the ocean and taking action against climate change.

A lawyer by day and an activist by night, I decided to marry my profession and my passion and pursue a master's degree (LLM) in environmental law focusing on the law of the sea and international natural resources law. After

completing my degree, I joined the Climate Change Fellowship Program with the Alliance of Small Island States to be trained as a climate change negotiator within the United Nations Framework Convention on Climate Change and I have since advocated for the ocean to be considered in this process. During this period, I was based at the Seychelles Mission to the United Nations, advising on matters related to the ocean, in particular biodiversity beyond national jurisdiction (BBNJ) and deep seabed mining. My time at the United Nations was formidable but being so far removed from ordinary people and nature caused me some discomfort and I was also eager to see results of my work. I was offered the opportunity to lead a conservation trust fund with the responsibility of providing grant financing for projects. Finally, I was in a position to invest in people and nature to ensure the sustainable management of the ocean. Although, this feels fairly new and different from my days in court and is a change in my career, I certainly do not regret it.

“ My story is not only one of a woman in the field of coastal and resource management but a young woman at the head of an organization that holds the purse strings.

Certainly, there are challenges. In the space of conservation financing, I am often the only woman at the table, sitting among many grey-haired men. All my board members are men and most of the representatives of the donor organizations are also men. I often have to keep smiling when they comment on my appearance and I wonder whether they have heard what I am saying or are merely distracted by my soft face. I have become accustomed to the change in facial expressions, from questioning what I am doing to “she is the person I want to work with.” I cannot dismiss all my male counterparts because my board members are supportive and often an experienced male CEO will take an hour out of their day to talk to me and share ideas about strengthening the Trust. However, my strong female networks have also been extremely helpful. I have been offered a lot of support from other female-led organizations, in terms of mentorship and actual support for the implementation of my vision for the Trust. There are many

opportunities to impact lives. During the first year of my tenure in this post, I insisted that accessibility and inclusion was the highest priority for the Trust. Much of my time was spent in the field sitting with fisherfolk, explaining how to access grant financing for projects that lead to the sustainable management

of the ocean. In partnership with other organizations, capacity building sessions were hosted, and this has led to the Trust achieving its goal of disbursing USD 750 000 in its first year. Additionally, I am proud to say that 54 percent of applicants were women, or women-led organizations. Because I am a young female Seychellois, my appointment has made many people realize that such organizations can be led by a Seychellois, and this has inspired others. I place sustainable leadership at the forefront of my thinking.

I am the first young female Seychellois to head SeyCCAT. It is a place of uncharted waters which allows me to be creative and innovative and to tweak and reform as I learn. My advice

to women planning to pursue careers in marine science or coastal management is not to be intimidated by the title of a position or the usual faces that you see in a space but dare to succeed. And you cannot succeed if you do not apply for the job!



BY GEORGINA
ROBINSON

Scratching the surface:

finding meaning in
murky grey sediment



“ I don't believe in glass ceilings – or glass slippers for that matter. Life is not a fairytale. Life is hard enough without “invisible” barriers hovering above us”.

wanted to write this article from the heart, in the hope that it will reach and inspire people, of any age, gender or background, but particularly women – across the Indian Ocean and further afield – to follow their dreams and make a difference. So perhaps this article should be re-named the “The naked marine scientist” – it might get more hits on Google!

I occupy an enviable position, living in Mauritius, in the heart of the Western Indian Ocean, working part-time as a marine scientist for the Scottish Association for Marine Science and consulting for the private sector

and international development organizations. I am also a single mother, with a young toddler, living far away from my family.

Raising a child on the other side of the world, with no support, has been both a challenge and a joy. I am lucky that my work patterns are flexible enough that I can work mainly from home where we can enjoy our island lifestyle, with regular trips back to see family in the UK. Until now, I have had to travel for work in order to earn enough money to support us, often to places that are remote and dangerous. This constant juggling of part-time academic research, consultancy and 24/7 childcare over the past one-and-a-half years has been stressful, but we are now entering a new phase of our lives.

I am extremely fortunate to have been awarded a prestigious Future Leaders Fellowship from UK Research

and Innovation worth £1.2 million (USD 1.5 million). This long-term, flexible funding is a game changer because it means I will be able to focus 100 percent of my energy on research, while fulfilling my parental responsibilities.

It offers long-term security, with funding for up to 10 years (part-time) and an open-ended permanent position at the end. The promotion from postdoctoral student to principle investigator, with a long research career stretching ahead of me, means I am getting close to breaking that elusive glass ceiling.

Below left: Collecting samples for my PhD research in the Kingdom of Saudi Arabia. **Below right:** Extracting DNA to study the sea cucumber gut microbiome on a commercial farm in the Kingdom of Saudi Arabia.



“ I was very young when I decided that I wanted to be a marine scientist. It wasn't iconic footage of a beautiful coral reef or a whale shark that inspired me, but rather footage of the seafloor taken by a remotely operated underwater vehicle.

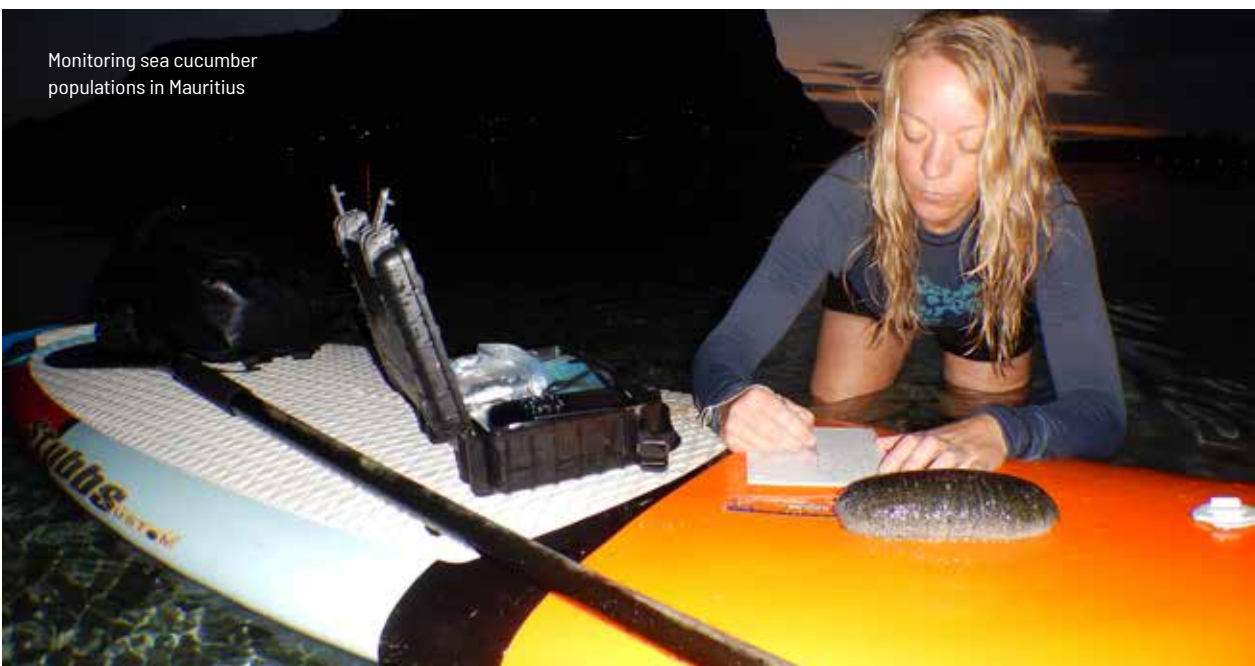
There was nothing interesting to see – just murky grey sediment. I am still obsessed with sediment and the sea cucumbers and microbial communities that live within it, unassumingly recycling nutrients to support higher levels of life, like those beautiful coral reefs and whale sharks.

I studied for a Bachelor of Science in Marine Science with French at the National Oceanography Centre in Southampton, with a year in France studying for a Masters in Oceanography. From my first summer holiday at university, I took money out of my savings to buy an air ticket to

Jamaica and some SCUBA diving kit and set out on my journey of gaining as much experience as I could. I spent a further year travelling around the world after I graduated, gaining further experience in the Indo-Pacific and Pacific islands. I started my early career living in Bajo fishing communities in southeast Sulawesi, Indonesia, studying the impacts of the reef gleaning fishery on benthic community structure. This sparked my interest in sea cucumbers, octopus and sea urchins that were sold for food or exported to markets in the Far East. Subsequently, I spent a few years in Scotland, developing integrated aquaculture of Atlantic salmon, sea urchins and seaweed, before returning



Far left: Surveying potential sites for sea cucumber aquaculture in Rodrigues, Mauritius. **Left:** Working for Loch Duart Ltd in Scotland, pioneering integrated aquaculture of seaweed, sea urchins and Atlantic Salmon.



Monitoring sea cucumber populations in Mauritius



If you would like any further information, please feel free to contact me:

Georgina.Robinson@sams.ac.uk

Further information can be found here:

<https://www.sams.ac.uk/science/projects/nitrofello/>

to the sunshine and working for the NGO Blue Ventures for two-and-a-half years, pioneering the development of community-based seaweed and sea cucumber aquaculture in southwest Madagascar.

When I started my PhD, I didn't even know how to calculate a standard error and had very little background in biology. After I completed the first growth trials for my PhD research, I was obsessed with understanding what caused the differences in sea cucumber growth, so I started sequencing the sediment microbial communities to try to understand what was happening. Since my PhD research was based on a commercial farm in South Africa, with no-one to ask for help, I became a self-taught bioinformatician and got my first sequencing study published in a Nature journal. Over the past few years, I have had a bit of time out due to maternity leave and other things, but I am now ready to start publishing some paradigm challenging science.

My fellowship has the ambitious vision of correcting imbalances in the global nitrogen cycle by harnessing system

microbiomes to upcycle reactive nitrogen in sustainable food production systems. Over the next 10 years, the research will develop transferable, scalable systems in temperate (UK) and tropical (Mauritius) marine and terrestrial environments to treat waste, produce high value protein and generate electricity by pairing N-rich and C-rich waste streams from agri-production systems. These innovative systems are designed to harness the concerted actions of microbial communities present in soil/sediment environments, and the guts of deposit feeders such as earthworms, sea cucumbers and polychaete worms, to upcycle reactive N to high value protein.

I am often asked, by friends and family, to offer advice to young people looking to pursue a career in marine science. I cannot offer a roadmap to a successful career because my own path has been a meandering one, transitioning between NGOs, industry, international development agencies and academia in 19 different countries. However, I found my niche early on and discovered the place where I thrive: at the interface of academia and industry.

“ The main advice I give to people wanting to start a career in marine science, is to get as much experience as you can.

This will count more than academic qualifications. I was only awarded my PhD three years ago at the ripe old age of 36, but for the past 12 years, I have been fortunate enough that I have never had to look for work. I am now recognized as an expert in my field and approached by international development organisations like the Food and Agriculture Organization of the United Nations, the United Nations Development Programme and the African Development Bank. Your reputation, ethics and network are the most important attributes you can develop, so make sure that you surround yourself with good people who have good ethics and are passionate about what they do. I believe that if you discover the things that you are passionate about, then doing really great science and making a difference will happen naturally.



Life as an academic

in the field of marine science

BY **CHANDANI APPADOO**

Field work, mangroves, October 2019

“ I was born as a village girl in Mauritius, from parents who worked in sugar cane fields. My parents did not know how to write or read, but they believed in education. I went to a girls’ college where I obtained my secondary education. My teachers, especially my biology teacher, were the ones who inspired me to develop my love for science.



Right: *Ampithoe laxipodus* Appadoo & Myers, sp. nov., ♂, 6.2 mm, Le Bouchon.

New species of amphipod (Crustacea), 2004



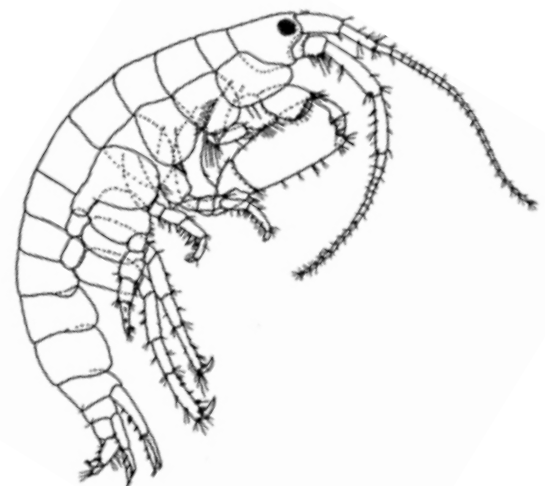
When I finished high school, I joined the University of Mauritius and achieved a joint Honours degree in chemistry and biology. I worked in a secondary school for a while, but my interest in science made me look for new opportunities. I joined the University as a young academic, while at the same time looking for opportunities to pursue my studies. I got a scholarship from the Swedish International Development Cooperation Agency (SIDA) and pursued my masters studies in biology at Memorial University Canada, with a project in marine science. I returned to my home university and started a PhD in the field of coastal ecosystems with a focus on taxonomy of crustaceans. I obtained some training from Cork University, Ireland, and I graduated in Mauritius in 2005.

At each step in my career as a student there have been challenges to overcome, whether it was the cold winters in Canada, with temperatures of -40 °C s, or the challenge of looking for funding to pursue my studies. As a female career academic working in the field of marine science for more than two decades, **I have been able to share knowledge in the field by teaching at undergraduate and master's level.** I have supervised a number of dissertations in the field, with a focus on coastal ecosystems. My main achievement to date is to see many of my students working in the sector, whether as scientific officers, education officers

and researchers, or pursuing their doctoral studies in institutions around the world. **It is a great achievement to meet different generations of ex-students during events such as World Oceans Day or at regional conferences.**

Publishing in research journals has been part of my career but my most enjoyable publication, and contribution to the region, was the publication of book chapter in the WIOMSA publication *Mangroves of the Western Indian Ocean: Status and Management*.

“ My career started as a marine taxonomist, working with and describing 19 new species of amphipods (crustaceans) from the Mascarene region.





“ From my own experience as an academic, where one has the opportunity to lecture, be involved in administration and research, all careers in the marine field, be they teaching, research or even entrepreneurship, are new opportunities to be seized.

I then began to work on all aspects of mangrove ecosystems, including faunistic work, distribution, ecology, and socioeconomics, and moving to subjects such as fish biology. My latest orientation is towards the study of marine ecosystems, anthropogenic effects and climate change and my new research direction is how research can contribute to society and how to better understand the marine environment and its challenges.

“ As a woman scientist, one has to be versatile, and ready to change and adapt to new areas of research. Two of the challenges that are constantly to be faced are: having partners and collaborators and securing funds for projects.

As an academic, I have served on many committees, both of a scientific and administrative nature, and at institutional, regional and international level. These roles – be they as a head of department, acting dean of faculty, a member of interview panels, or as a board member or conference session chair – allow a woman to

express her views in the sector and contribute to decision-making. I have also been involved as a reviewer and recently as review editor for the *Global Environmental Outlook 6 Report* and this has been a great learning experience at international level.

My message to women who want to embark on a career in marine science, is that this is a challenging sector, but it is also a sector of opportunity because the concept of “blue economy” is gaining in importance.

Today, women can get into the field more easily and there are training opportunities available, but it is the interest that has to be there. There has recently been interest in networking, and this is key to guiding new generations and developing regional pools of experts. The inspiration to work with the marine environment and the will to make a change in the lives of people, be it in education and scientific research, in sustainable use and protection of our resources, or in making policy changes, are some of the guiding principles to be adopted.



Top: Field work, May 2019.
Left: WIOMSA special session 2019.

Right: WIOMSA conference 2019, member of local organizing committee.
Below: Field work on seaweeds with BSc Marine Environmental Science students (2016).



Left: Review Editor, Global Environment Outlook, GE06, Egypt, 2018.

Diving in unchartered territory

A view of the Ghara creek from the citadel of Banbhore

BY **HEBA HASHMI**

“

I often hear maritime professionals say that they have always been in love with the sea. For me, such a claim would be a gross exaggeration. While I was never obsessed with the sea, I certainly took it for granted – whether growing up in the blistering winds of Killiney Beach in Dublin, or living next to the urban foreshore of Clifton, Karachi. Silent waters have constantly lapped at my attention as I wandered down career paths that were unconventional and unchartered for a Pakistani woman, and finally running headfirst into those waves as a maritime archaeologist has felt a bit like coming home.



Left: Ongoing excavation in the citadel of Banbhore.
Far left: An aerial view of the Banbhore citadel.

From top to bottom: Posing with my final conserved metal object at ICUA Zadar. Conserving metals found underwater at ICUA Zadar. Working with my partner in the lab at ICUS Zadar. Using a sandblaster at ICUA Zadar

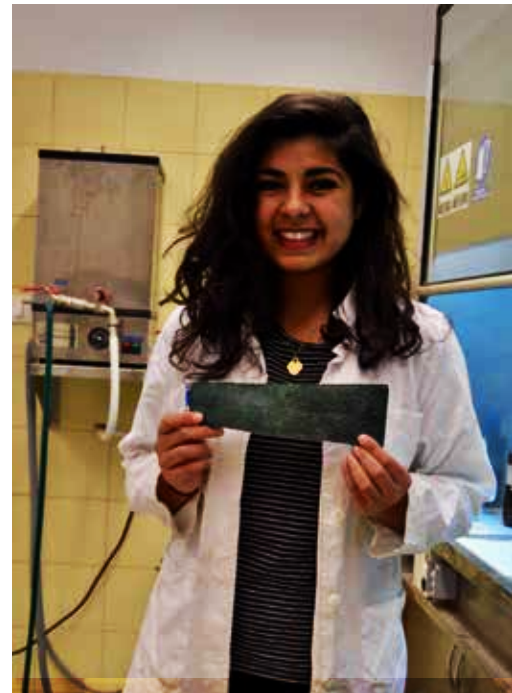
After completing my Master of Arts degree in Cultural Heritage Studies/Managing Archaeological Sites at University College London, I moved back to Pakistan as a wide-eyed heritage manager looking to change the way archaeology is defined and conserved, in a developing country that is only just shaking off the vestiges of colonial rule. I got to see and do great things with my dream organization, the Aga Khan Trust for Culture, one that harnesses historic preservation for community rehabilitation. However, after four long and lonely years spent with my nose in a laptop, I was ready for something a bit more adventurous.

It's only when we stop for a quick second to check in with our professional selves that everything around us becomes a source of inspiration – books, films, conversations, even music! While my inspiration was a heady mix of all the above, in retrospect what stands out is a passage from Elizabeth Gilbert's life-altering novel *Eat Pray Love* which ends with the line

“ This is a peaceful harbour, the entryway to a fine and proud island that is only now beginning to cultivate tranquility.”

Reading this passage amplified a shy whisper of a possibility that I could specialize in maritime archaeology “maybe in a few years”, to an urgent call to do it NOW. Within the next three days, I was a certified Open Water Diver and within the week I was enrolled in three different courses for fieldwork training in underwater and intertidal archaeology in Europe. The only way I could explain or justify this life decision to my friends and family was with the juvenile exclamation, “what if I find Atlantis?!” That finding a lost city in the sea would ever become a reality wasn't even on the fringes of my Disney-fuelled imagination – but life had other plans.

Those familiar with the history of trade in the Western Indian Ocean will know that Debal (also known as Barbarikon, Pattala, or Diul, depending on the historical epoch) was a thriving harbour town and mercantile stronghold located at the mouth of the Indus Delta in Sindh (now in Pakistan). Referenced in the Periplus of the Erythraean Sea, accounts of Arab seafarers like Ibn Majid, as well as of European officials charting out the Indian Subcontinent, Debal flourished at an international land and sea crossroads that connected the Central Asian steppes to the Indian Ocean, the Persian and Arab civilisations to the Indian subcontinent and China, and was a maritime gateway to the Gulf, East Africa, Ceylon and Southeast Asia. However, as was the fate of many historical communities at the mercy of an ever-changing river, the harbour town was soon lost to the ravages of sandstorms and time, never to be found again.



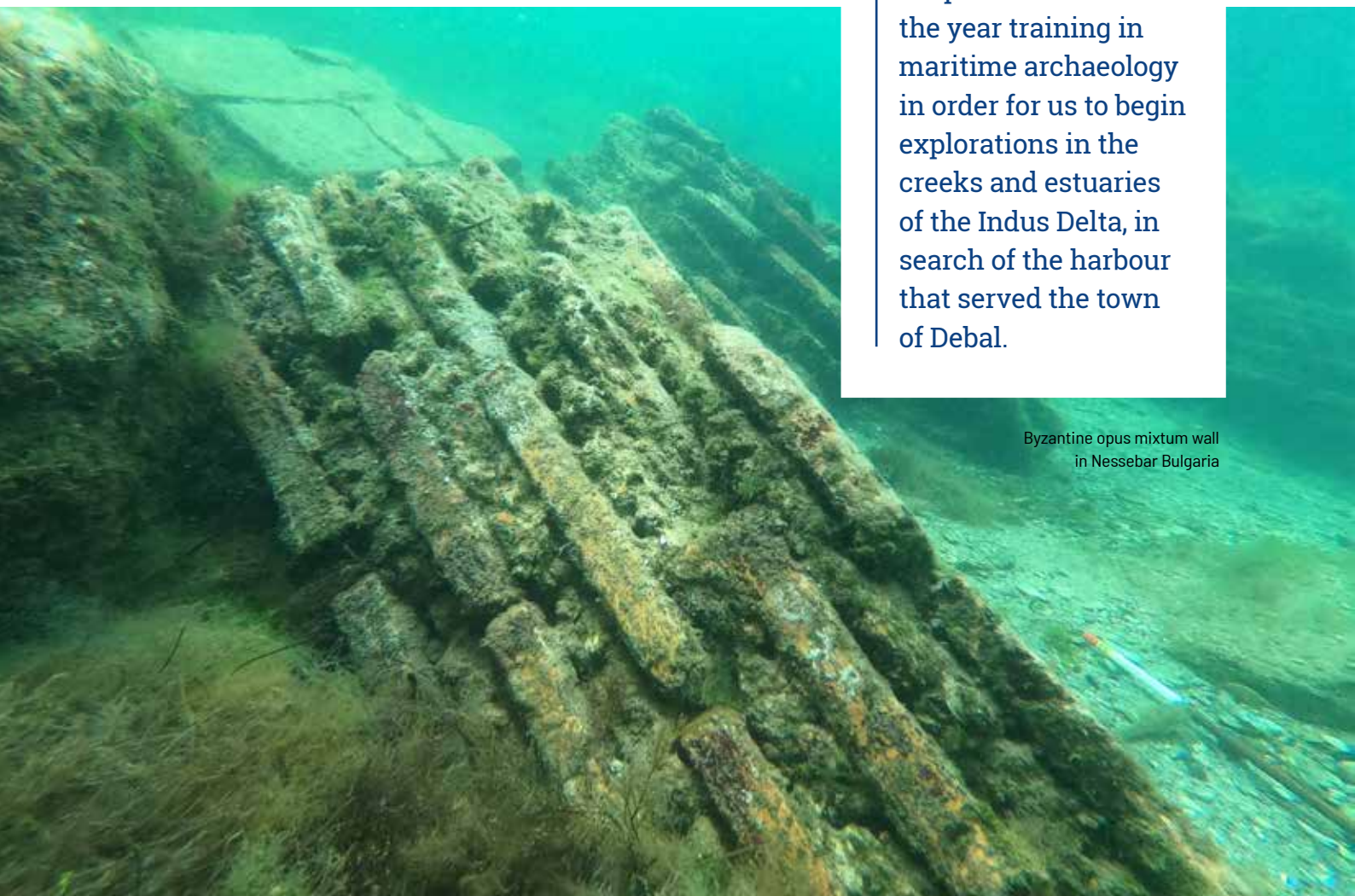
Until, of course, I met Dr Valeria Piacentini - Scientific Director at the Catholic University of the Sacred Heart (Milan), leader of the Italian Historical-Archaeological Mission in Pakistan who breathlessly announced earlier this year that she had found evidence that confirms Banbhore, the site of an ongoing archaeological excavation on the coast of Sindh, to most likely be the lost port of Debal. Partly awestruck, partly amused at this ironic twist of fate, I listened carefully as she explained how features excavated inside Banbhore's bastioned citadel include religious/administrative buildings and workshops of luxury goods (ivory, glass, mother of pearl and pottery). Outside the ramparts stretches a vast area in which recent surveys have identified an industrial sector with

metallurgic activity and dyeing vats, funerary sites, residential quarters and a sophisticated hydraulic management of the coastal territory. The last, albeit most crucial, evidence that has yet to be investigated, is the harbour itself – the final missing piece that may settle a debate that has persisted since the British Archaeological Society of India's reconnaissance missions in the 19th century.

I spent two weeks with Dr Piacentini's team in Banbhore, training in the basic principles and methods of terrestrial archaeology. I then spent a month at the International Centre for Underwater Archaeology in Zadar, Croatia, in an advanced course on the conservation of metal finds from

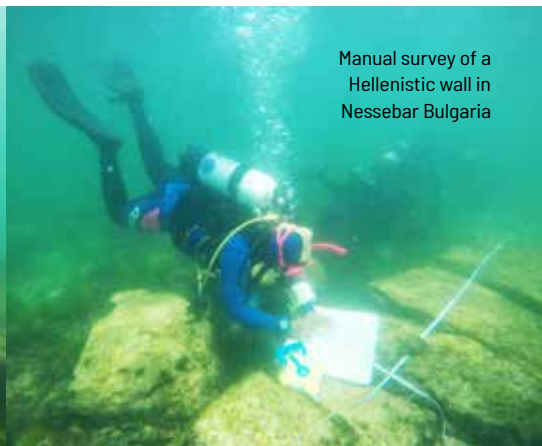
“ From one woman (a historian and archaeologist with decades of invaluable international field experience and wisdom) to another (a novice diver with no training or experience but dreams as monumental as the task ahead of her) - the plans and conversations that followed that meeting were magical. Our goal was clear: I was to spend the rest of the year training in maritime archaeology in order for us to begin explorations in the creeks and estuaries of the Indus Delta, in search of the harbour that served the town of Debal.

Byzantine opus mixtum wall in Nessebar Bulgaria





Cleaning a submerged Hellenistic tower in Nessebar Bulgaria



Manual survey of a Hellenistic wall in Nessebar Bulgaria



Posing triumphant after completing on-site documentation

underwater environments. Together with my course-mates – also two women, one from Mexico and the other from Spain – I studied and practiced methods of manual and chemical cleaning, desalination and finds processing, as well as understanding how a conservation lab functions, with the aim of setting one up on site in Banbhore. After completing a three-day course in the Nautical Archaeology Society (UK) Introduction to Foreshore and Underwater Archaeology, I then attended the Balkan Heritage Field School's month-long Underwater Archaeology Field School in Nessebar, Bulgaria. Being the only student representing the Western Indian Ocean, I felt both pride and apprehension at the size of the task that lay ahead of all this training – which was to set up maritime archaeology in Pakistan, a country with no trace of such an industry.

For a country with such an important river, such an important delta-port and such an important role in maritime trade in the Western Indian Ocean, it is almost criminal that maritime archaeology has not been scientifically explored in Pakistan. Our 700 km coastline and our continental shelf in the Arabian Sea lie untouched, most likely well-littered with historical evidence that could date back to the medieval Islamic period, Alexander's conquest of Sindh in the fourth century BC, or indeed the Indus Valley Civilisation in the third millennium BC. Since completing my training, I have been in lengthy conversations with

specialists in the Pakistan Navy and maritime experts working in marine biology and conservation with the WWF, all of whom agree on the importance of maritime archaeology, as well as the difficulty of the task of introducing it in Pakistan. Special emphasis has been placed on this being doubly difficult for a young woman, especially one without a PhD. While I initially saw this as a setback, I have decided to rise to the challenge, and will pursue a PhD at the University of Southampton in 2020.

Under the generous supervision and encouragement of Dr Lucy Blue at the University of Southampton, I am in the final stages of refining my topic, which will focus on attempting to understand the complex network of harbours on the Indus Delta through a combination of geomorphological and historical investigation. This study will hopefully open a door to scientific exploration in the delta, and the establishment of an archaeological inventory of coastal, intertidal and submerged sites recorded. The ultimate aim is to draw up an integrated heritage management plan for the Indus Delta, one that accounts for all current values associated with the coastal zone, including economy, power generation, international trade and living traditions. Despite having endless support from my academic supervisors, fellow professionals and my family, the biggest hurdle I have faced so far is funding for my PhD, one I am addressing head-on in as many creative ways as I possibly can!

It's been a long journey to get here, and an even longer one lies ahead but it has already accorded me with some valuable life lessons.

“ The most important lesson I have learnt, one that is so crucial for all women in all professions to understand, is the value of fear – and the endless possibility of what lies beyond it.

As women, we tend to focus our energy on addressing tangible, outward-facing fears: personal safety, inadequate representation, unequal pay. In the process, we forget to address fears that hide within us, ones that ultimately trip us up the most: the fear of failure. The fear of not being good enough. The fear of accidentally outgrowing society's limited expectations of us. These fears are blessings, and indicators that we are about to do or experience something that is fulfilling beyond our wildest dreams. So, if you ever find yourself feeling the giddy fear in your stomach before your first dive, the terrifying fear before handing in a resignation letter, or the daunting fear of planning to change the face of your industry – jump. Sign. Lead. Some of the best experiences are waiting for you on the other side of convention.

The **beauty** of life **under water**

BY **NANCY IRABA**

Exploring the Ocean.

“ I am pursuing a master’s degree in Marine Sciences at the Institute of Marine Sciences at the University of Dar es Salaam (UDSM). My journey started in 2014 when I was selected to pursue a Bachelor of Aquatic Sciences and Fisheries at the UDSM. This was both a confusing and exciting journey because despite not knowing what the future held with this unplanned career, I was learning new things every day.

Previously, I had dreams of becoming a medical doctor because I studied sciences in my A-level exams, majoring in physics, chemistry and biology, but going through the course in marine science felt like taking an uncertain ride towards my future. Fortunately, thanks to the mentorship and direction of outstanding female lecturers and mentors who I met during my time at the university, such as Dr Lulu Kaaya and Dr Blandina Lugendo, I learnt that it takes personal effort, passion and determination to stand out in a primarily male-dominated field. Practising that daily, I was able to attain a grade point average that paved the way





Below left: Discover marine species that can save humanity.
Below right: Identification of benthic biodiversity on board the Second International Indian Ocean Expedition (IIOE-2).

for me to gain a scholarship from the Swedish International Development Cooperation Agency and continue with master's studies at the Institute of Marine Sciences, Zanzibar.

My journey has not been all about academics – in the midst of working hard towards achieving my dreams, I discovered how many challenges there are to be solved, such as the mismanagement of coastal resources, the impacts of climate change and population pressure. The fact that only five percent of our ocean has been explored drove home the point that the field of marine science is in dire need of daring, innovative, problem-solving scientists like me.

“ Further, the under-representation of women in this sector globally challenged me to step up to the plate, so to speak.

Since then I have applied for a number of opportunities and I was lucky to have been part of the SA Agulhas II research

cruise, the Second International Indian Ocean Expedition (IIOE-2) in 2017 and 2018. My participation was funded by the Intergovernmental Oceanographic Commission and I formed part of the benthic oceanography team. We took a month to explore the ocean from Tanzanian waters through to Comoros and the Mozambique channel. Despite falling sea-sick every now and then, it was an exhilarating journey of discovery. **I enjoyed mingling with experts from different fields of oceanography (biological, chemical, geological, physical, social sciences) as we collected different organisms and ocean data.** I got practical experience in using different analytical tools. There was also sharing of resources, exchange of knowledge and opportunities to learn about the operation of various ocean gear. It was a period of professional growth and personal transformation for me as a young marine scientist learning from experts and seniors with several years of experience. Not only did the research cruise open up new doors for collaboration, and friendships with other marine scientists in Africa, but it also increased my curiosity, encouraged me to learn more and discover the path I

wanted to specialize in. It exposed me to the beauty of life below water and since then I have been actively using social media to share my knowledge with the public about ocean sciences.

I am looking forward to working on the socio-economic potential of octopus farming in Zanzibar during my master's thesis, because I believe that aquaculture is a way towards sustainable fisheries and food security in our oceans. I am also looking forward to taking diving lessons at the end of this year, to inspire more women to join me in exposing the beauty of life underwater.

To the young women planning or thinking of pursuing careers in marine sciences, the doors are open.

Women are very few in this area and opportunities for career advancement are endless, but only with hard work and determination. Pick mentors that you can look up to and believe in yourself. When one woman dares to break the glass ceiling, it sets the path for others to follow. My wish is to see more young women and girls taking a lead in this vast field of marine sciences in terms of academia, research and decision-making processes.



The building blocks of a **successful** island girl.

BY HELENA E. SIMS

Helena in a free dive

“

I think sometimes we learn
who we really are and then we
live with that decision.

– ELEANOR ROOSEVELT, THE LONGEST SERVING FIRST LADY OF AMERICA



When did Helena Sims learn who she really was? Perhaps at age two when she discovered the joyous freedom of the ocean and started to swim? Possibly.

Advancing that love of the sea as she watched Disney's Little Mermaid for the zillionth time? A clear influence for sure. When she was six she was faced with the upturned shell of a sea turtle stuffed with a traditional turtle dish at a local party. She screamed, she flayed her fists and kicked at the chef as she was put into a taxi and taken home, very distraught. That shaped her thoughts.

Through childhood she challenged herself and her resolve each morning from 5.30 to 7am in the National Pool at Roche Caiman. Here she dug deep for pockets of resilience when the Russian swimming coach ordered the National Swim Team to swim four kilometres during the morning session. This was a test-and-a-half when school loomed and her body ached. She would return in the evenings to train. Essentially, she would be in the pool from sunrise to sunset! She did this daily for eight years. Helena is adamant that her swim training shaped her both physically and mentally for the many challenges ahead. Helena also started PADI SCUBA diving courses aged just 10 and was a Dive Master by the age of 18, working holidays at the Dive Centre at Lemuria Resort on Praslin.

At school, Environment Eco-Clubs were just starting up and Helena was a founding member, active and encouraging, winning prizes for essays and public speaking, appearing on local television shows and already making a name for herself, under the watchful eyes of people like Miss Jeanette Laue and Ambassador Ronny Jumeau, both of whom have been great mentors to Helena throughout her school career and in later years.

“ By 14 years of age her short story entitled “My dying blue universe” was published in “Pachamama Our Earth Our Future”, a book which was a joint project of the United Nations Environment Programme and Peace Child International, in partnership with UNESCO and UNICEF.

Helena learnt who she was as she challenged her body as seriously as she challenged her mind. She completed her A levels at Polytechnic with straight As in maths, chemistry and biology and won the President's Award for the cohort of 2003.

It is clear that by the age of 18 Helena knew that the ocean was her calling and with this knowledge she chose her degree accordingly.



Helena is adamant that every twist and turn in her life have been slowly moulding her for these rewarding positions; opportunities to really make a difference not only in her country but also to the world.

A Thalassophile (lover of the sea) was therefore born in Seychelles, created in Seychelles and flew off to Australia to continue her studies at James Cook University, where she graduated with high distinctions and was the recipient of several awards in the schools of Marine Science and Marine Chemistry, including an offer of a direct PhD scholarship; all to Seychelles' credit. Helena could not take up the scholarship, however, as she was bonded to the Government of Seychelles and was required to return home to give back to her country. She did so willingly and with great pride.

Upon her return, little did she know that she would begin to chart a course that would eventually lead to her being appointed Chairperson of the Board of the Seychelles National Parks Authority and the Project Manager of the

Seychelles Marine Spatial Plan initiative. You see, upon her return from university, she started her first job in the research section where she would monitor reefs within and outside the boundaries of the marine parks and witness first-hand the devastating effects of multiple mass coral bleaching events. She would learn that although all reefs within and outside the MPAs would bleach, those inside the MPAs would recover faster. She analysed over 10 years of monitoring data which confirmed these observations, and others.

When she moved on to a non-governmental organization a few years later, she coordinated an integrated coastal zone management project on two islands of Seychelles. There she learned the social skills and values of bottom-up approaches to management

of the coastal zone and the importance of involving communities at the planning stage. In this post, she built relationships and trust among stakeholders which would, unknowingly, help her in her future endeavours.

Always eager to learn more and challenge herself further, she took a post to provide technical backstopping and later on to manage a United Nations Development Programme, Global Environment Facility Protected Areas project which looked primarily at the expansion of the MPA network in Seychelles. The project results are very visible today and ongoing. They include work on the world-renowned coral reef gardening in the Cousin Special reserve, the drafting of Seychelles' first protected areas policy that includes



Helena at TNC

co-management of protected areas and, finally, modelling to identify priority areas for MPA expansion in the Seychelles.

The latter is key as this data was then used to inform the Seychelles Marine Spatial Plan Initiative which started in 2014, facilitated by The Nature Conservancy (TNC). When the Protected Area's project came to a close, Helena was faced with several career options, all of which were compelling and attractive. She decided to go with her passion and accepted the post of project manager of the Marine Spatial Plan Initiative with TNC. When she started, less than one percent of the Seychelles' exclusive economic

zone (EEZ) was protected. Today, protected areas covering 26 percent of the EEZ have been gazetted. The target is 30% by 2020 or just over 400 000 square kilometres. Helena lives comfortably with her decision to follow her dreams into shaping the environment of Seychelles. Yet there is still more to learn about her.

Helena was greatly honoured when asked to assume the mantle of Chairperson for National Parks Authority in February 2018 and her vast experience to date will ensure that the reigns of this vital authority are in safe hands as it started its transition to financial autonomy

in January of 2019. The transition is expected to be a challenge for the organization but the team has been gearing up to face it head on with – for the first time in Seychelles' history – a woman at the helm.

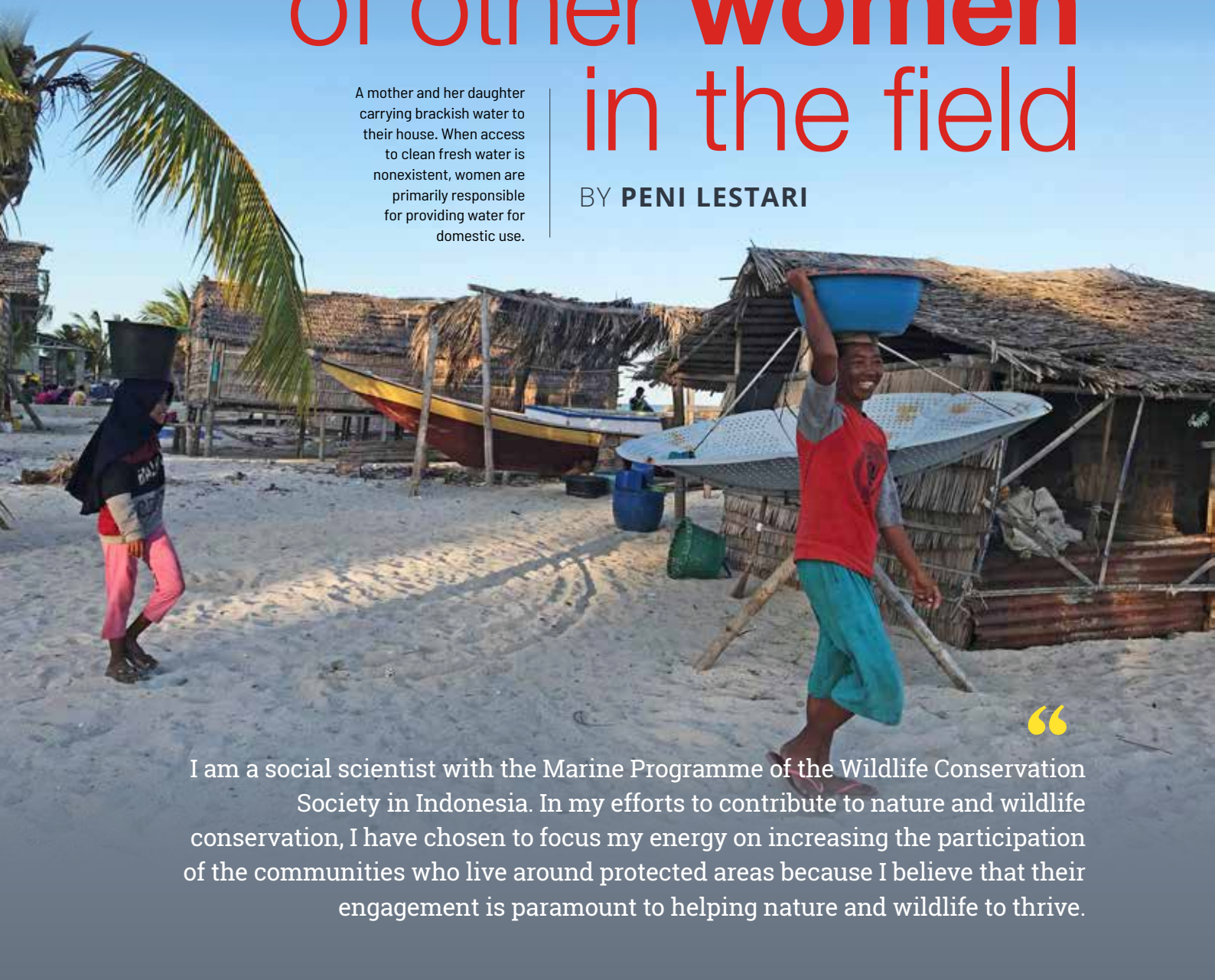
Helena feels blessed to have been raised and to be living and working in such a beautiful country. Her heart beats to the rhythm of the ocean of Seychelles, she is truly an island girl by nature and profession. Although she missed an opportunity for a PhD in her earlier years, she is adamant that everything happens for a reason in life. She confirms this by the mere fact that the subject for a PhD she would choose today would be vastly different to that selected by her earlier self. Today it would be on a subject geared towards ocean governance and law where she believes she would have a greater chance of informing decision-makers through sound policy development informed by science. Her advice to young women following a career path in marine resource management is to persevere and to trust the steps and enjoy the journey.

As a Seychellois would say "you must walk before you run".

Be supportive of other women in the field

A mother and her daughter carrying brackish water to their house. When access to clean fresh water is nonexistent, women are primarily responsible for providing water for domestic use.

BY PENI LESTARI



“

I am a social scientist with the Marine Programme of the Wildlife Conservation Society in Indonesia. In my efforts to contribute to nature and wildlife conservation, I have chosen to focus my energy on increasing the participation of the communities who live around protected areas because I believe that their engagement is paramount to helping nature and wildlife to thrive.

As a socio-economic specialist, my main task is to conduct socio-economic monitoring across WCS Indonesia's sites which cover more than 25 marine protected areas (MPAs) in both the western and eastern parts of this huge country. Communities close to these MPAs share some similarities, but at

the same time, each has its own distinct characteristics, such as language, values, tradition, culture and habits.

To conduct the socio-economic monitoring, I usually build a team of local people or community members, combined with university

“ **Working with coastal communities can lead to exciting adventures. For those who wish to pursue a career in this field**

students who are studying marine-related subjects. The team typically has an equal number of male and female members. Prior to data collection, the team always receives intensive training on survey methodology, the ethics of human subject research, and the methods we use to conduct interviews with coastal communities. Having a mixed team has its own perks and disadvantages. Some of the advantages are smoother and easier interactions with the communities. It also lessens the language barrier and helps the team to adapt to the local habits and values. However, some of the challenges include gaps in catching up with the survey methodology, digesting the information given, and lack of probing. This can lead to a “response bias” where people answer the questionnaire according to what they think is socially desirable. To address these drawbacks, I usually need to spend a lot of time with the team, providing opportunities for trial runs, and creating informal space for discussion.

Beside exercising and enhancing the team’s skills, leading the socio-economic monitoring provides me with the opportunity to collaborate with local communities, students, government agencies, national and international scientists. These collaborations also give me the chance to learn new skills necessary to get my work done efficiently. **This job also takes me to some beautiful and remote places in my own country where I experience new things, interact with people from various backgrounds, and have the pleasure of learning from them.**



A family processes fresh fish for drying. Dried salted fish is more expensive and practical when cold storage is not available.

During the learning process, one of the challenges is to blend with local people. I’m an outsider who doesn’t speak the local languages across this multilingual country.

But, because I also don’t look like a typical Indonesian woman (pixie haircut, boy’s clothing and plenty of piercings) I usually draw the local people’s attention – whether they are children, teenagers, men or women, the community members are often curious about me. I’ve learned to turn their curiosity to my advantage, using it to open doors and start conversations. Plus, a sincere smile always helps to melt the ice! Other than awkward initial situations, one of the challenges of conducting interviews with male fishers is talking with them while they are smoking and trying discreetly not to be bothered by it. With the female fisher or female member of the household, the challenge is to convince them to participate in the study. To counter this obstacle, I usually take a longer time to get to know them better, asking about their daily life and issues before jumping into the interview topic.

Working with coastal communities can lead to exciting adventures. For those who wish to pursue a career in this field, I can share some tips.

First, don’t be afraid. Along the way, you will find many women and men that support you. Next, don’t fall for stereotyping, put that label behind. Be who you are and disclose the goal of your visit. When you are honest, you are more likely gain the community’s trust. You also need to be flexible with your working hours because community work can involve a lot of field work. Invest time to stay in the community – it will help you to understand the context and it is easier to approach people when they already know you. For the field work: educate yourself about local customs before you go and dress accordingly; beware of the heat, and lower your expectations. For example, if you’re a vegetarian, try not to ask for vegetables in a small remote area where greens are non-existent. Last, but not least, be supportive of other women in the field: you will be amazed by what they can achieve when they have the opportunity to shine.

Reach out and grab the waiting opportunities

BY MIRANA FABIOLÀ
ANDRIANANTENAINA

Mangrove restoration

“

As a young conservationist and leader with a background in conservation biology, I have worked in different fields such as herpetology, as well as with lemurs and humpback whales in different regions of Madagascar. It was through this work that I discovered the fascinating world of marine biodiversity. I am currently a programme officer at Community Centred Conservation, or C3, in Antsiranana in northern Madagascar.

“ The conservation of marine mammals and marine ecosystems captivates me.

Marine biodiversity in Madagascar and around the world, faces enormous pressure because of human activities and climate change.

Due to my interest in marine mammals, I chose to undertake my internship at C3 in 2017 because this organization is dedicated to the protection of marine megafauna and its ecosystems in this region. C3 focuses on conservation to avoid extinction and works to reduce threats to the habitats and ecosystems of marine megafauna. As a project manager of the Rigny Bay key biodiversity area, I am responsible for the improvement and strengthening of the community's capacity to manage the bay. I am also responsible for data collection and reporting on the project activities to the principal donor –Critical Ecosystem Partnership Fund (CEPF). I also monitor turtles nesting sites within the bay.



Top right: Mirana Andrianantenaina.
Bottom right: Bodypit measurement of sea turtles.

I am developing a database for our non-governmental organization and striving to ensure that it is sustainable and thrives, not only through the easy times but also through challenging and extreme conditions.

I have acquired a lot of skills working with the local community, despite my age and gender, factors which are often debilitating in a largely patriarchal community. I am currently working on strengthening my writing and communication skills. The Rigny Bay project has opened doors for me. I interact freely with community members and deliver presentations and speeches on endangered species and habitats and generally raise awareness of the importance of co-management in the marine conservation area. Women rarely speak in public in this part of the world and interacting with male fisherfolk was a daunting prospect to say the least. Nonetheless, I took the challenge full on and I am now able to debate with them on the access to, and sustainable management of, marine resources.

I am passionate about promoting teamwork for the achievement of objectives. My upbeat and engaging personality, my willingness to learn new things, commitment to helping others and my dedication to my organization are all assets in my quest to solidify my career as a woman in marine science. In my view, it is no longer a big deal to be a working, independent woman, what counts is being passionate and persevering in the field you have chosen.

“ To the women interested in pursuing a career in the field of coastal and marine resource management, I say that the world is your oyster, you only need to reach out and grab the waiting opportunities.



Caparace measurement of sea turtles



Community Outreach



Nesting beach of sea turtles in the Northern of Madagascar

Serendipity, perseverance & gratitude

tackling your early 20's
one experience at a time

BY **JOSHEENA NAGGEEA**

“When I started working with coastal communities on the small island of Mauritius, never in my wildest dreams did I imagine that I would pursue my research on coastal management for my home country at a prestigious university like Stanford University in the United States.



Josheena Naggeea with a fisherman on the opening day of the first seasonal octopus closure in Mauritius. © Sydney Perrine.

My formal education at Monash University Malaysia was the starting point where I was inspired to dedicate my life to nature conservation. I owe it to my incredible undergraduate supervisors, Professor Catherine Yule and Dr Robyn Wilson, who made sure we learnt about tropical ecology through the most remarkable field trips in Southeast Asia. Even though my undergraduate degree in Environmental Management was more focused on tropical ecology for terrestrial systems, I transitioned into the marine world when I was 22 through a combination of my Honours degree research on coastal wetlands and a short research assistantship on a sea turtle conservation project in Malaysia.



We saw nesting turtles every night and spread awareness about sea turtle conservation amongst tourists, whilst also learning about the complex social issues related to poaching. I was drawn to the human–environment conflicts rife in Southeast Asia, but I could not forget an appeal made by Dr Phoebe Barnard, presently the Chief Science and Policy officer at the Conservation Biology Institute, who had worked in Africa extensively. At the Tropical Biology Association field course in Tanzania in 2014, Dr Barnard, who was a mentor on the course, stressed the fact that Africa needs its scientists to come home and help support conservation efforts! My undergraduate field trips led me to breathtaking places such as Taman Negara, one of the world's oldest tropical rainforests, and pristine wilderness in Gunung Mulu and Danum Valley in Borneo. These experiences enabled me to understand how insignificant we humans are within the complexity of our ecosystems, as well as comprehend the disruptive nature of our actions. I was certain that I wished to continue this passion for environmental conservation back in my home country, but I was unsure how to go about it.

At 23, I returned home to Mauritius, trusting a path would open for me. I spent some time volunteering with the Mauritius Wildlife Foundation on a pink pigeon conservation project, before serendipitously being offered an opportunity as the programme manager at a local marine conservation non-governmental organization (NGO), *Lagon Bleu*. The NGO was embarking on a national collaborative project on sea turtle conservation and had several other ongoing projects related to education and monitoring of the lagoon. As much as the offer excited me, it was also daunting for a recent graduate. The NGO had only three full-time staff

members and dozens of international and local interns and volunteers, which meant I would be managing an incredibly diverse team for the first time. But I was young and passionate and ready to take on any challenge!

Through this position at *Lagon Bleu*, I had the opportunity to lead several environmental awareness campaigns, including a marine

Eco-Guide certification programme for tourist operators in a marine park, and a national campaign to promote eco-conscious tourism. I was actively involved in the first national closure of octopus fisheries in Mauritius: a pioneering initiative led by multiple stakeholder groups. While there were several instances when I doubted myself, I dived into the experience and its steep learning curve, which allowed me to hone new skills and attributes. I learnt on the job and from others around me. Practice and dedication do not make you perfect, but they do make you better every day.

My deeply personal connections with the communities with whom I interacted so closely during that period became the motivating force behind my research.

Coastal communities had this unbreakable connection with the sea; they understood in their own way the complex linkages between every component of the ecosystem. Fishers recognized the significance of the mangrove to the coral and the fish, whilst keeping in mind their own economic constraints, as they conducted their livelihoods. During my time with *Lagon Bleu*, I changed my preconceived idea that most fishers are unaware of, or do not care about, the complex ecological balances that exist in nature. It was a truly humbling experience, knowing that my academic background missed a critical component – the human element!

“ Building trust is no simple task, but I genuinely enjoy learning from fishing communities and acknowledge their incredible knowledge of, and contribution to, coastal resource management.

Pursuing a career as a woman, in the male-dominated field of marine conservation and resource management has not always been easy. Throughout all the collaborative projects I was involved in at *Lagon Bleu*, my collaborators, including several strong women leaders working in communication, the government and other NGOs, left an indelible print on my growth. I leaned on these women for advice when I felt unsteady. I have been in collaborative meetings where the powerful women kept the whole group on their toes and accountable for the goals set, and that was awe-inspiring. Confident women do bring about change. With time, I found my own voice in this complex field involving social-ecological systems. I continue to build my expertise to tackle the multifaceted problems that we are faced with in coastal and marine resource management.

Another considerable personal challenge was justifying my choice to work at the grassroot level to people around me. I realized early on that to do impactful and meaningful work, I needed to understand issues at the local level. How can one improve policy without genuinely grasping the perception of the resource users? Through my work at the NGO and multiple collaborative projects at national level, I got a sneak peek into what components worked within this system and what needed improvement.

Throughout this arduous process, I was grateful that my family was supportive and understanding of me pursuing my passion, which demanded long hours of work. Simultaneously, knowing how hard it was to create a niche for myself in a male-dominated field, I was inspired to persevere, so other parents would be open to their daughters venturing forth

into conservation and marine-related fields. I was grateful for the privilege of my family's unending support, be it with working as a young woman at an NGO, as well as now, as a PhD student. As I continue my PhD research, **I am aware of the need to support the younger students I interact with and I try to do so as much as possible, knowing that my experience can be passed on to a new generation passionate about environmental conservation and sustainable development.**

While pursuing my career, I realized that I needed a larger platform to channel my efforts and address some critical knowledge gaps in the context where I was working. During this time, I met Krish Seetah, an Assistant Professor at Stanford University, at an ocean conference organized by the US Embassy at the University of Mauritius. He encouraged me to look into an interdisciplinary program at Stanford University that would allow me to continue working with communities in my home country, whilst celebrating those relationships. It was a golden opportunity, and I was strongly supported by the supervisors and project partners I had worked with since graduation.

Through my ongoing PhD research, I stay close to my roots by continuing to support marine governance in small island states like my home country, currently bearing the brunt of the impacts of climate change. I am exploring innovative ways of sustainably managing marine protected areas (MPAs) in the Western Indian Ocean. My study focuses on adaptive management of MPAs, community inclusion and the valorization of natural and cultural heritage in marine resource management. I hope that my

research on MPAs helps to promote understanding of the complexities of local environmental stewardship efforts – the guiding light of all my work – and eventually help the communities I have worked with, as well as others.

As a woman in the field of science, technology, engineering and mathematics (STEM), I constantly wonder if my voice will matter, given the range of complex environmental and social challenges our planet currently faces, combined with

the nagging feeling that women are considered inferior, more often than not. However, I do know that we should not stop. We cannot stop. My doubts have often subsided after meeting other passionate women taking on challenging roles at home in Mauritius, in the Western Indian Ocean region, or at university and I am encouraged to keep going further.

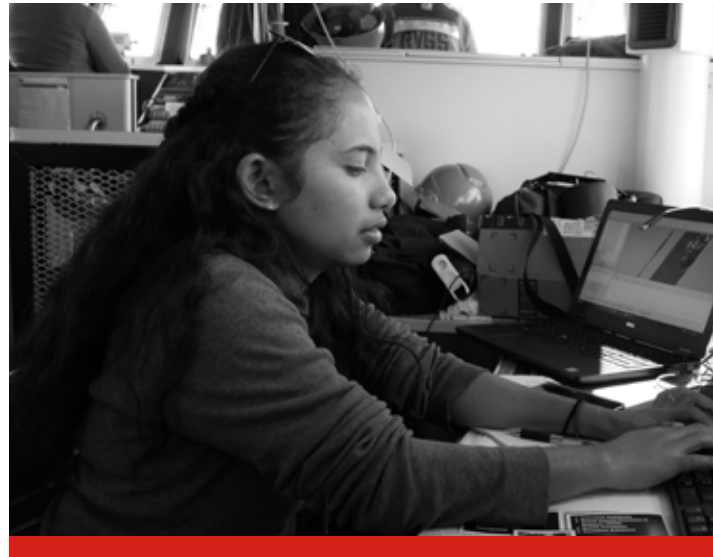
When I reflect on my journey, I realize that I owe it not only to my efforts and my family's support but also to the incredible mentors and peers whom I have been fortunate to meet. My advice to other young women keen to join the field of coastal and marine resource management would be to keep an open mind, embrace all experiences, big or small, have a collaborative mindset early on, never be scared to ask for help or support when you need it, be confident but humble, and remember that the learning process never ends. You will probably learn the most from the fisher spending hours at sea! Lastly, don't overplan. From my personal experience, success happens in incremental steps. Indeed, life is what happens while you're busy making other plans!

Dipping my toe in the ocean

BY **TINAH MARTIN**



“I come from a small inland town in the highlands of Madagascar. For much of my life, the sea-side of the island was a mystery; it was a fantastic world I thought I might never see. My undergraduate studies in animal biology first led me to the rainforest, but in 2008, once I began receiving professional training in coastal and marine protected area management, my focus permanently changed to the ocean.



Over the past five years, I have been involved in different projects in the fields of marine resource management and coral reef conservation. This work has been both rewarding and challenging. Madagascar's coastal water has extremely high numbers of endemic aquatic life, nearly all of which are facing dreadful threats of extinction. Unfortunately, only a few Malagasy people have received appropriate training in the techniques and technologies that can be used to counter these threats. Perhaps as a result, much of the research being conducted on Madagascar's oceans focuses on a very narrow number of topics and is conducted by a limited group of researchers, few of whom are Malagasy. As a Malagasy native, and especially as a Malagasy woman, accessing up-to-date technical training in the sciences is a constant challenge.

Opportunities to learn

When I graduated, my interest in marine science was growing and I was eager to cement my skills in fisheries biology. I asked myself: how would you understand the dynamics of a resource or the methods you are writing in your proposals if you have never experienced it? After earning my Master's degree in Applied Oceanography from the *Institut Halieutique et des Sciences Marines* in Madagascar I made a first attempt to increase my practical knowledge in the field. In 2012, I joined the African Coelacanth Ecosystem Programme's Suitcase initiative (2012) aboard the research vessel SA *Agulhas II*. The project I participated in sought to establish a potential link between the East Madagascar Current, Madagascar Ridge and associated seamounts' influence on the distribution of surface and subsurface chlorophyll. The skills I gained during that training were valuable because I now understand the importance of practice and ethics in science and research. My next lesson was in learning "not to be afraid of the unknown".



“ As I recently joined the Women in Marine Science network, my next goal is to get more women involved in seafloor mapping in the Indian Ocean region!

Far Left: Working onboard the RV Gulf Surveyor. **Above:** During the summer hydroclass in New Hampshire.

During my master’s thesis, I collected and identified fish larvae from partially degraded coral reefs in the shallow waters of Madagascar’s southwestern coast. I found evidence that human exploitation of the reef was negatively influencing the species assemblages that reside there. However, shallow reef ecosystems are only part of this story. At that time, I had not been exposed to hydrography, bathymetry and the opportunities that would bring answers to such questions, but I was convinced that mapping Madagascar’s coastal areas and ocean floor would be a great tool to help in accurately assessing the extent of coral communities – in shallow waters as well as in the deep sea. Identifying the location and size of these reefs is an essential first step to studying their structure, biology, species diversity and degree of human impact.

My big opportunity came in 2016, when I was accepted to be a Nippon Foundation GEBCO Training Scholar in Ocean Mapping and Ocean Engineering at the University of New Hampshire. I faced different challenges during the 12 months of training: technical skills and terminology that were very different from my background, culture and language barriers, not to mention the adverse weather. Each of these aspects of my training shaped my future: learning to persevere and always ready to face the unexpected, living in a multicultural environment and adjusting to each situation so as to make the most of it. Overcoming each of these challenges was a most rewarding experience because each triumph boosted my confidence and my will to get my foot in the door of seafloor mapping and choosing to pursue this great adventure.

Today I am a Staff Associate at the Geoinformatics Group at Lamont Doherty Earth Observatory of Columbia University, focused on the Nippon Foundation GEBCO Seabed 2030 Project. Seabed 2030 is a collaborative project to inspire the complete mapping of the world’s ocean by 2030 and to compile all bathymetric data into the freely-available GEBCO Ocean Map. One of the several outreach efforts I led during this year was the special session co-organized by the Seabed 2030 Project and the Nippon Foundation GEBCO Training alumni from the Indian Ocean during the 11th WIOMSA Symposium. Our session was called “Cascading the GEBCO Seabed 2030 Project towards a Regional Coordination Approach to build a Bathymetric Map of the WIO Region”. It was a great event and we look forward to collaborating with the research community in the Western Indian Ocean region to achieve our goal by 2030.

My message for young women

It is important to connect to yourself, to be aware of what your interests are and the options that you have. Join and connect to a network of passionate, devoted and hardworking women involved in science, especially in the coastal and maritime field. Achieving your dream is not a dream, you can do it if you really want it.

Nature lover, conservationist and marine scientist

BY NYAWIRA MUTHIGA

“ I consider myself a marine scientist and conservationists but also a lover of nature, both marine and terrestrial. I currently work for the Wildlife Conservation Society (WCS). I head the Kenya marine programme and undertake studies on coral reefs across the western Indian Ocean (WIO).

Growing up, there were many events that influenced my desire to pursue marine science and conservation. I have always been fascinated by nature and as a tomboy, I spent a lot of my time climbing trees and exploring the outdoors which was unusual for a girl at that time. My interest in science started at an early age with a curiosity about plants, insects, birds and other creatures that I encountered in my explorations. My mother, who thought she had an unusual girl child, nevertheless encouraged my interests, exposing me and my siblings to nature through magazines and trips to the Nairobi National park and orphanage. I was first exposed to the marine environment while growing up in Dar-es-salaam, Tanzania, in the early 1960s.



Above Left: Coral reef survey at Mbudya marine reserve, Tanzania in 2004.

Above Right: Coral reef survey at Mitsio, North West Madagascar.

It was a great time to grow up in East Africa – our countries had recently become independent and there was an air of optimism and empowerment. My mother took us to the beach every weekend where we spent afternoons swim ming and exploring the tidal pools. I remember being fascinated by the strange creatures and objects washed up on the beach, and the drama of my brother getting stung by a jellyfish. My interest in the oceans continued to grow. The movies made by Jacques Cousteau, the pioneer who developed the aqua-lung and SCUBA diving, fascinated me and a field trip in high school to Kanamai introduced me to the wonders of coral reefs. I remember the vivid colors of the reef fish, the different shapes

and sizes of the corals, the long black spines of the sea urchins, the tidal pools teeming with life. Everything was new and fascinating – it was like exploring alien life. During my Bachelor of Science degree at the University of Nairobi, I joined an expedition to the Malindi Marine National Park, one of the first marine protected areas (MPAs) to be established in Africa.

“ I learned to SCUBA dive, which gave me a fascinating and different view of the marine environment.

I also learned to identify corals, echinoderms, gastropods and fish, skills that set me on the path to becoming a marine scientist focusing on coral reefs. I used some of these skills for my senior thesis, a study of coral growth rates at different distances from the Sabaki river. Planning, executing and writing up a senior thesis was my first exposure to

the process of marine science and gave me confidence in my ability to become a marine scientist. I was totally captivated and I have been “hooked” ever since.

I was fortunate to get many opportunities to grow on my journey to becoming a marine scientist. My first job at the Kenya Marine & Fisheries Research Institute (KMFRI) exposed me to the challenges of undertaking marine science. I knew I wanted to work on coral reefs but like many institutions in Africa at that time, there were limited resources for undertaking scientific studies. Luckily, there was a small reef in the creek adjacent to the institute. With a snorkel, mask and fins, I spent hours on this reef improving my coral taxonomy and field assessments skills. I continued to learn other skills, including proposal writing and I applied and received a scholarship for a Master of Science degree in biological oceanography at the Florida State University. For my thesis, I decided to study the physiological mechanisms that allowed corals to survive in different salinity and

temperature conditions. Imagine my surprise when I found out that there were no drivers, coxswains, technicians or secretaries to assist students! I learned to drive and skipper a dinghy, to build aquariums, to analyse water samples, to programme calculators and to type, all skills that were not academic but that were crucial to completing my degree. Although this was a very challenging time, I learned important lessons, the key one being that I had to be prepared to acquire whatever skills were required to get ahead.

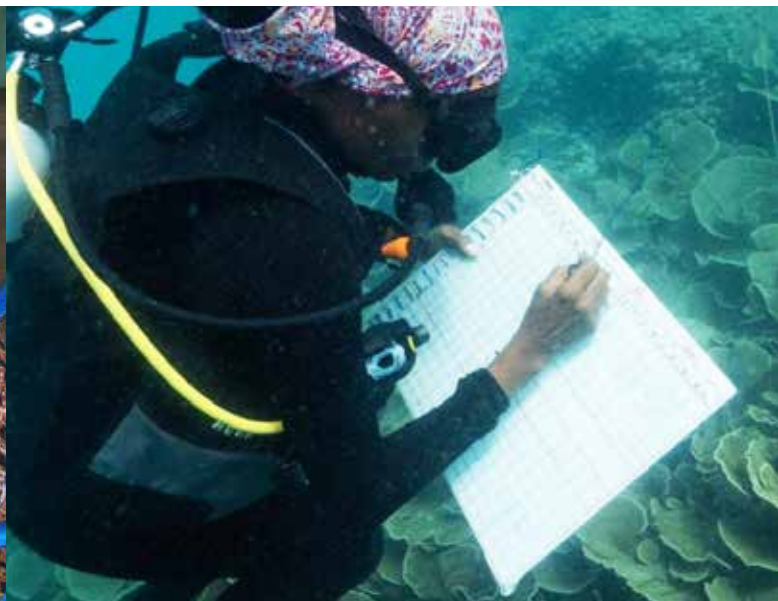
It was also important to develop the skills to communicate with the public and decision-makers and to be an effective organizer/coordinator. Finally, it was crucial to continue teaching and educating the future generation of marine scientists. I gained experience and many of these skills after I left KMFRI to take up a position in the Kenya Wildlife Service (KWS), the national organization responsible for conservation and wildlife in Kenya. This provided me with the opportunity to do both science and conservation as the

head of a comprehensive programme that included coordinating research and monitoring and building the capacity for the management of MPAs and other wetlands. The programme greatly contributed to the improved management of MPAs because of the training and skills development, and hence professionalization, of MPA staff.

One of the challenges that I experienced at this time was balancing the needs of my family, a PhD at the University of Nairobi and the new position at KWS. Luckily, I had a strong support system at home and was able to complete my PhD, although it took longer than planned. While at KWS, I rose to the position of Assistant Director, one of the first women to get this position in KWS. However, after a number of years, I found myself at a crossroads with more and more time spent doing administration and less time doing what I loved – marine science and conservation. I therefore joined the WCS where the work is more balanced between science, conservation of coastal and marine species and ecosystems throughout the WIO and administration of the programme.

“ It was not until I finished my MSc that I came to the realization that in order to be an effective marine scientist in coral reefs and other critical coastal and marine ecosystems and species, I not only had to do high quality science, but also to engage in capacity building for managers, conservation practitioners and communities.

Below Left: Facilitating the Kuruwitu Beach Management Unit co-management plan development in Kenya.



I have now been involved in marine science and conservation for more than three decades. My work initially focused on human impacts on coral reefs, but the bleaching event of 1998 shifted the focus from understanding local human impacts to regional and global impacts and climate change, as well as the mechanisms and processes that enhance or impede the management of coral reefs. More recently, our programme has focused on building the capacity of communities for co-management and supporting the process of expanding MPAs, including the transboundary area between Kenya and Tanzania and the Malindi-Watamu seascape. Along the way, I have been fortunate to work with many collaborators and partners including scientists, managers, local communities and students. I have authored and co-authored 102 scientific journal articles, books and book chapters, contributing knowledge to our understanding of coral reefs as well as generating solutions for management. I am also honored to have contributed to the capacity building of marine sciences in East Africa by serving as the President

of WIOMSA. During my tenure, the association grew from a membership of 500 to 1 200, developed a new strategy and received large grants for the Marine Science for Management Programme.

I have been fortunate to be recognized for my work and have been awarded several conservation awards including the Buffet/National Geographic Society award for achievement in conservation in Africa 2005, the Award for Conservation Excellence in 2017 and the Kenya Presidential Award, Order of the Grand Warrior in 2005.

Throughout my education and career, I have had the good fortune of having a strong support system, through my husband and family, and mentoring from many exciting and incredible teachers that positively impacted my personal and professional growth. I believe that it is important for those of us who have knowledge to share it and pass it on to future generations.

My advice to young scientists is:

- 1) **know your field well**, which means learning all the skills that are required and keeping up with the literature and technologies. This will help you to hone your skills to the highest standards in your field;
- 2) **engage with the potential users of your science**, including managers, users and decision-makers. This will make your work more useful;
- 3) **actively involve yourself in the fraternity of your profession**, including communicating your findings broadly and undertaking pro-bono and voluntary activities such as active membership in different networks in your field of interest. This will expose you to new ideas and open up potential opportunities for collaboration and funding;
- 4) **be adaptive and willing to learn and change as new ideas and innovations are generated**. Science is about discovery and exploration; a rigid and non-reflective mindset may result in stagnation. In this way, one is able to be relevant, to contribute to the wider community and ultimately have a more satisfying career.



Left: Nyawira Muthiga receiving the ACE (Award for Conservation Excellence) with Tim McClanahan in 2017

THE NETWORK FOR WOMEN IN MARINE SCIENCE (WiMS)

was launched during the 10th WIOMSA Scientific Symposium in 2017 to address the gender equality issues that are facing women marine scientists.

Join **WiMS** and **sign up** for membership at wims.wiomsa.org

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About **WIOMSA**:

The Western Indian Ocean Marine Science Association promotes the educational, scientific and technological development of all aspects of marine sciences throughout the Western Indian Ocean region with a view towards sustaining the use and conservation of its marine resources.



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