

Career Sheet: Research Scientist in Nature-Based Solutions



Cristina Calheiros, Research Scientist and Professor, CIIMAR

I am an Environmental Engineer with a PhD in Biotechnology. I work as a research scientist at CIIMAR-Interdisciplinary Center for Marine and Environmental Research, in the field of Nature-Based Solutions (NBS). I am an invited professor at the University of Saint Joseph (Macau SAR, China) and the University of Porto (Portugal). From early times, I integrated projects related with Nature-Based Solutions (NBS) applied to different contexts being recently involved in the project “ecological and integrated sanitation-ECOSAN”, “Nature-based solutions for a cleaner and safer Macao” and in the “COST Action CA17133 - Implementing nature-based solutions for creating a resourceful circular city”. I also participated in several projects related to education for sustainability. I am a senior and Board member of the Order of Engineers (North region) and Vice-President of the National Portuguese Association of Green Roofs. I develop an active role in environmental education and engagement with associations, companies and municipalities related to NBS and climate change mitigation and adaptation actions.



OVERVIEW OF THE JOB

My job as a researcher focuses on developing Nature-Based Solutions (NBS), such as green roofs and walls and constructed and floating wetlands, to answer societal problems aligned with sustainable development goals (SDG). Further on, NBS envisage the efficient use of resources towards sustainability of territories and as tools for climate change adaptation and mitigation. It involves “working with Nature” in several dimensions and having a solid STEM base of knowledge. I integrate several programs for testing business models for technologies developed in academia. I have three lines of action related to NBS that are devoted to scientific research, education, and associations engagement. I collaborate with educational institutions, municipalities, companies and associations. The STEM background allowed me to have the skills to perform at the highest level in the path that I followed.



WHAT INSPIRED YOU

I always had an interest in the subjects related to the environment and nature dynamics and interactions. I was certain that I wanted to do something useful to society, something that I could do with passion and joy. My grandmother showed me what environmental engineering was and the possibilities of paths that I could follow. Afterwards, I discovered the world of scientific research and

working with Nature-Based Solutions. I realized the potential that I had ahead: innovating, gaining knowledge and pass it on to others through collaboration and teaching.



TYPICAL WORKING DAY

A typical working day starts with the update of the ongoing experiments and projects with colleagues and students. I do a lot of field sampling campaigns on the experimental sites, where the Nature-Based Solutions (NBS) are implemented and work in the laboratory. I give classes and lectures on NBS at the university and go to elementary schools to work with teachers and students on this theme. Often, I deliver courses to municipalities technicians and the general public. Other activities included meeting with international partners related to ongoing projects, keeping updated with the scientific literature, and attending international conferences. I am also engaged in several associative movements related to education for sustainability and towards dissemination of NBS and climate change mitigation and adaption solutions.



STUDY & CAREER PATH

I did not know what to follow after finishing high school, but I was fascinated by understanding the Earth system, the human's actions impact and what to do to minimize or avoid it. It led me to follow Environmental Engineering. I did an internship in the United Kingdom (UK) related to phytoremediation of contaminated soils that allowed me to have an overview of what it could be "working with nature", the potential of international experience and the power of collaboration and knowledge exchange. Afterwards, I received a PhD in Biotechnology at the Portuguese Catholic University and completed two postdoctoral training related to Nature-Based Solutions applied to water management, treatment, and reuse. I always tried to keep track of the latest advances in science and technology through the establishment of networking and attendance to advanced courses and conferences. It allowed me to have a holistic view of the Earth system and prospects of how to contribute to society and towards a sustainable future. My career path followed an interdisciplinary approach where Science, Technology, Engineering, and Mathematics (STEM) were always present and interconnected.



KEY SKILLS

Key skills at the Professional level:

Analytical skills: being up-to-date in the research developed, using adequate analytical tools and data analysis. Having critical thinking and problem-solving capacity.

Technical and Engineering skills: being able to have a practical and hands-on approach to the daily challenges that need to be addressed.

Business: at the level of NBS application, the skill of business storytelling allowed me to scale up and replicate the solutions, delivering the concept to stakeholders and decision-makers. I was also recognised with several honours and distinctions for the ideas developed and applicability of NBS.

Communication: the key to success is to be open to collaborate with people. I have developed presentation/public speaking and writing skills in order to disseminate the work and research advances.

Information Technology: having the skill to manage the data through computer graphics and incorporate them in technical reports, publications, and educational resources.

Management: keeping the team and students motivated. Strategic planning of the research direction is of utmost importance to achieve the envisaged results and manage the resources available.

Marketing: nowadays, strategic science outreach in different channels (social media, television, newspapers etc.) and with an established network is essential to disseminate the scientific advances being inclusive, in a way that is accessed and understood by all.

Personal and social skills:

Motivation and Resilience: a researcher in this field must be motivated and resilient to drawbacks and have the strength to continue.

Curiosity and Creative: it is important to keep an open mind towards discovery and use creativity to find innovative solutions.

Teamwork spirit: only collaborating and working in teams with ethics, will be possible to put in practice the ideas and made them work.

Self-discipline: I have a work discipline, methodology, and a high level of organization that allow putting in practice interdisciplinary work.

Productivity and responsibility: in the research field, we expect a high productivity level, commitment to this purpose and the associated responsibility when researching a topic.

Initiative: I am proactive in designing the solutions to meet the societies challenges and needs as the sustainable development goals (SDG).



CAREER PROSPECT

Someone with my skills can work in academia as an educator or as a researcher. They can also work in providing services and consultancy related to environmental education and education for sustainability.

A research scientist in NBS can work in the private sector as an expert in environmental biotechnology and engineering, dealing with water management, solid waste treatment and ecosystem preservation and rehabilitation, from implementation to operational and maintenance aspects. Another option is to work in municipalities departments dealing with environmental issues and strategic planning for climate change mitigation and adaptation challenges.



CHALLENGES

When working with Nature-Based Solutions in scientific research, you must have an interdisciplinary approach since 'working with Nature' needs a holistic view. The big challenge is that you have to deal with different backgrounds of knowledge and opinions to develop and study a solution. Working in scientific research is also challenging since there is some uncertainty concerning experiments' results and trials, although it makes it exciting and fascinating. You can feel that you are contributing to something useful and meaningful.



YOUR ADVICE TO STUDENTS

If you are trying to discover what studies to follow, which path to take, look inside and try to identify what you like to do, what brings you joy and makes you feel passionate. This way, you can think about how you can contribute to a better world and make your footprint meaningful.

Be curious and open-minded. It is very important to speak with people with different backgrounds. That way, you will have a vision of different paths and how you can tailor your own. Every time your school organizes talks, lectures, and has visitors, use this as an opportunity to get to know other realities and have an insight into what is happening in the world. Always believe in your dreams and make them happen.



YOUR ADVICE TO TEACHERS AND PARENTS

Whenever possible, facilitate contact between students/children and professionals that have different career paths. This way, students can see the panoply of choices that they can follow.

Be active in identify their potentialities and support and guide them through the way of bringing up the best they have. Encourage your students/children and invest in their training, education and skills development. If given the opportunity, they will get to know themselves better and be confident in the future they choose.



LEARN MORE



Cristina Calheiros profile:

<https://www.cienciavita.pt/portal/en/5D10-BCF9-05F6>

Public Lecture on Nature-based solutions for water in cities:

<http://ise.usj.edu.mo/events-calendar/public-lecture-nature-based-solutions-for-water-in-cities/>

A COST Action on circular cities and Nature-Based Solutions:

<https://www.youtube.com/watch?v=eNOBjt9RTyQ>

CIIMAR – Nature-based solutions for water management and ecosystem services promotion:

<https://www.portoprotocol.com/case-studies/ciimar-nature-based-solutions-for-water-management-and-ecosystem-services-promotion/>

ANCV (the Portuguese National Association of Green Roof):

<https://www.greenroofs.pt/>

Widening Interdisciplinary Sustainability Education (WISE):

<http://wiseproject.info/>

Partnership for Sustainable development and Social innovation (PASSION):

<http://passion.civitas.edu.pl/>

Geoethics Outcomes and Awareness Learning (GOAL):

<https://goal-erasmus.eu/>

