TERM 1, 2023

CAREERS WITH STEM™

ENVIRONMENT +DATA

WILDLIFE SCIENTIST

5 minutes with a climate scientist
p7

Become an environmental manager
p3

Meet role models saving the planet with data
p4

CAREERSWITHSTEM.COM

WILDLIFE + CLIMATE CHANGE + CONSERVATION + MANAGEMENT + DATA SCIENCE + MACHINE LEARNING

DIGGING THE DATA

You can save the planet faster and more easily if you've got the numbers that tell you what most needs to be done and when

How many animals are endangered because of climate change and what can we do about it? How fast are our forests disappearing and how well are we preserving them? Which reefs are thriving and which need special care and attention to survive?

All of these environmental questions rely on data. If you're someone who loves digging the data, here's the good news: you'll be in demand for every career that uses data (think, most of 'em). Data analysis and machine learning skills are just as needed in environmental careers as they are in traditional tech careers.

You can protect the environment and futureproof your career by working in environment + data and artificial intelligence (AI). You'll be making a difference and opening up a world of employment opportunities for yourself. Win-win-win.

At school, you'll need to study maths and digital technologies. But you don't need to be top of the class – and if communication and English are your best subjects, well, they're super important for these jobs, too. We need people who get the tech but can also communicate what the data is telling us so that we can get everyone on board the mission: saving the planet. – *Heather Catchpole*

SKILLS SHORTLIST

- ☑ Love of the environment
- ☑ Good communicator
- ☑ Teamwork (always!)
- ☑ Coding and other digital skills (can be learnt on the job!)
- ☑ Mathematics, especially statistics (but you don't need to be an expert)
- ☑ Interested in technology

Want to save the environment? Take our quiz to find your perfect conservation career. **bit.ly/eco-career-quiz**

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A well-rounded career

Scott Hazelden uses his qualifications in environmental management to make sure Aussie iron ore producer Fortescue Metals sticks to its eco-obligations

Scott wasn't sure what he wanted to do straight after school, so he enrolled in a University Preparation course at Edith Cowan University, which covers a range of skills and offers an introduction to uni before you land on your degree.

After lots of chats with student services and uni lecturers – and with his love of geography and biology in mind – Scott signed up for a Bachelor of Environmental Management. And he couldn't have been happier with his choice – highlights included field trips to Walpole and Dryandra, both in southwest Western Australia, to study coastal and marine management, and ecology.

Scott's next choice was where to work. It was after completing a subject on environmental impact assessments during his degree that he decided on WA's mining sector. "In my mind, there is no better industry to put your environmental management expertise into practice," he says.

Scott is currently environment superintendent at Fortescue Metals Group, an Australian iron ore producer. His job is to ensure the company sticks to its environmental obligations, which he does through environmental reporting, monitoring and inspections.

This means managing a lot of data, and Scott says his team is always looking for ways to automate data reporting so they can spend more time analysing the numbers and using them to inform smart, sustainable business decisions. – *Gemma Chilton*

> **"THERE IS NO BETTER INDUSTRY TO PUT YOUR ENVIRONMENTAL MANAGEMENT EXPERTISE INTO PRACTICE"**

5 planet-saving careers using AI+Data

Meet five real-life role models combining their passion for the environment with data, machine learning and artificial intelligence

#1

WILDLIFE CONSERVATIONIST AND TECH ENTREPRENEUR

WHO: CAMILLE GOLDSTONE-HENRY
TECH: CLOUD COMPUTING, DATA ANALYTICS, ARTIFICIAL INTELLIGENCE (AI)

"If you could define my childhood, it would be 'wildlife obsessed'," Camille says. You could define her career the same way.

After graduating with a Bachelor of Animal and Veterinary Bioscience from the University of Sydney, Camille had an incredible career in conservation that saw her work with Tasmanian devils, native species in Kakadu National Park, and even leatherback sea turtles in Costa Rica. However, during all these experiences she noticed a recurring problem.

Her job involved working with government, businesses, not-for-profits, other scientists and academics, community and landholders. "Each organisation had specific information that was really important for making decisions as to how we save species in the wild," Camille explains. Such decisions might include, for example, where to release a species to give it the best chance of survival.

"Often I didn't have the right information at the right time," she says. This 'data gap' not only held back conservation efforts, but it endangered animals already threatened with extinction.

CONSERVATION GAME CHANGER

To address this problem, Camille skilled up in tech and, two years ago, launched Xylo Systems, a cloud-based software platform that helps conservation organisations to share data and make decisions.

Camille believes the platform "is going to be a game changer for the conservation space".

As for her future goals – short-term, Camille wants to grow Xylo Systems internationally. But long-term? "Our ambition is to be out of business," she says. "I hope we've done our job and reversed biodiversity loss. We don't say that to investors, but it's the truth." – *Gemma Chilton*

NEXT STEP: LISTEN TO OUR PODCAST EPISODE FEATURING CAMILLE TALKING MORE ABOUT HER CAREER PIVOT FROM CONSERVATIONIST TO TECH ENTREPRENEUR AT CAREERSWITHSTEM.COM/PODCAST

@camillegh @camille_gh

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@douglasthron777 @douglasthron

#2

DRONE PILOT AND ANIMAL RESCUER

WHO: DOUGLAS THRON
TECH: DRONES, INFRARED CAMERAS

Douglas rescues animals from disaster areas and works with researchers to remotely gather data about vulnerable species. In 2020, he visited areas devastated by the Australian bushfires to locate animals.

"As a wildlife cinematographer I used my cinematography as an activism tool to protect wild places. Once drones came out I used them as a tool to showcase the beauty of wild areas that needed to be protected. Later on I got the idea to put an infrared camera on a drone to help find animals during natural disasters. The infrared camera works by seeing the body heat of an animal and then we can go in and rescue it much faster.

"I was pioneering the use of infrared drones to find koalas after the giant fires. It was challenging because they were often so high in the trees, and the outside temperatures were so warm, that it was hard to get the infrared to decipher between what was a koala and what was hot leaves or bark on a tree!

"There was a lot of trial and error but finally I was able to mount a zoom-lens camera and also a spotlight on the drone to help identify what was a koala or not. After that I was able to save dozens of koalas – one of my most rewarding experiences." – *Heather Catchpole*

NEXT STEP: WATCH DOUGLAS' DRONES IN ACTION ON CURIOSITY STREAM AT BIT.LY/THRON

#3

APPLIED SCIENTIST AND BUSINESS FOUNDER

WHO: ALISA STARKEY
TECH: MACHINE LEARNING, SATELLITE DATA

Alisa runs Ozius, a business that uses remote-sensing technology, AI and environmental science to uncover insights about built and natural environments. She says she first learnt about the benefits of data while she was doing an environmental science degree at the University of Wollongong.

Ozius Biome is a program that can measure global forests and biomass using data from NASA and the European Space Agency's Copernicus program, for example.

"We're able to tap into data sets to look at height and cover and overall structure of the forest," Alisa says.

"From local communities to big global businesses, we can respond to the global climate challenge. One thing that we get to see by analysing satellite imagery is that when everyone works towards a goal, we can really make a difference." – *Heather Catchpole*

OZIUS BIOME VEGETATION HEIGHT PRODUCT. VEGETATION HEIGHT IS A KEY PRODUCT WITHIN OZIUS BIOME PRODUCED SEAMLESSLY ACROSS AUSTRALIA AT 20M SPATIAL RES

NEXT STEP: TRY OUT THE EARTH OBSERVATORY MISSIONS AT EO KIDS AT GO.NASA.GOV/3YNJ6AU

NEXT STEP: LISTEN TO VANESSA'S FULL STORY ON ABC RADIO NATIONAL AT AB.CO/3V5J6W8

#4

WILDLIFE SCIENTIST AND SCIENCE COMMUNICATOR

WHO: DR VANESSA PIROTTA
TECH: 3D X-RAYS, MACHINE LEARNING

Wildlife trafficking is a problem globally, but often we're only getting part of the story as we only know about the animals that have been smuggled after the smugglers are caught. Vanessa, a wildlife scientist and science communicator, says AI could help to prevent wildlife crime.

"It's a cruel practice and also a big biosecurity problem as we don't want exotic animals that can spread disease," she says. Vanessa is part of a team helping to train AI to know what to look for when scanning luggage or people at an airport, for example.

AI learns by using a data set to build up a picture of something so that it can recognise it in real life. AI can be trained to recognise 3D X-rays of wildlife in much the same way that your smartphone can be trained to unlock after recognising your face.

"The more information we have on a variety of animals, the better we can be at stopping this activity," she says. – *Heather Catchpole*

#5

DATA SYSTEMS ENGINEER

WHO: DAVID CROSSMAN
TECH: FACIAL RECOGNITION TECHNOLOGY

David works at the Australian Institute of Marine Science. He studied a Bachelor of Information Technology at James Cook University and now uses his tech and data skills to manage ReefCloud. ReefCloud helps marine scientists and other reef users to instantly get detailed information about reefs, including the Great Barrier Reef, using facial recognition technology.

By analysing reef images uploaded by snorkelers and marine scientists, ReefCloud can identify types of coral and their colours to see how the reef is changing over time. The vast amount of data it contains is stored and accessed using Amazon Web Services (AWS).

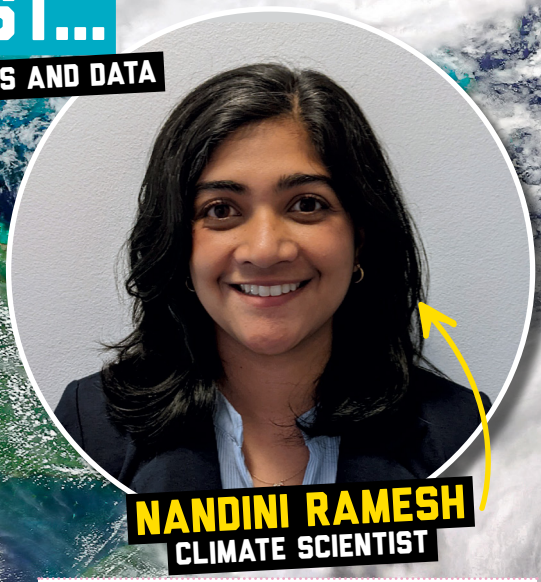
"We are in a race against time – there is no 'undo' option for us to save the reefs. Once the window is closed, there is no turning back," David says.

"Using AWS, it now takes us hours to make sense of data sets that previously would have taken our data teams months, enabling us to focus on what we do best," he says. – *Heather Catchpole*

NEXT STEP: UPLOAD YOUR OWN REEF IMAGE TO REEFCLOUD. FIND OUT HOW AT REEFCLOUD.AI/HOW-IT-WORKS

5 MINUTES WITH A CLIMATE SCIENTIST...

NANDINI RAMESH USES CUTTING-EDGE MATHS AND DATA TECHNIQUES TO INFORM HER RESEARCH



NANDINI RAMESH
CLIMATE SCIENTIST

What's your job in a nutshell?
I study how physical processes in the ocean and atmosphere influence and impact Earth's climate and the changes we should expect. I focus on large-scale phenomena in the tropics such as El Niño and La Niña events and monsoons.

How did you get here?
I grew up with a love of maps and geography because my family moved a lot when I was a child. I realised in high school that I found physics to be an exciting way to think about the world around me. I pursued an undergraduate degree in physics followed by a master's degree and a PhD in earth and environmental sciences at Columbia University. It was there that I learned about statistics and machine learning.

How do you use data skills to help the environment in your job?
I analyse large amounts of data from satellites and other instruments using supercomputing systems. These powerful systems allow me to run climate modelling experiments.

Coolest part of your job?
Getting to use complex, quantitative skills to answer questions about the Earth, while contributing to solving one of humanity's greatest challenges.

Why should someone interested in the environment skill up in data for their future career?
In order to work on important questions, scientists need to have the skill set to access, manage and analyse large amounts of data.

Will new tech like artificial intelligence (AI) have a big impact in the world of conservation?
AI is a powerful tool that can accelerate scientific discovery and enable us to find solutions more efficiently than ever before. Scientists are using AI to tackle challenges from bushfire management and sustainable and enhanced agricultural productivity, to better understanding complex weather patterns and protecting the Great Barrier Reef.

What's your advice to someone who wants a career that combines environmental science and data?
Don't focus on data science to the exclusion of subject knowledge, but develop both skill sets in tandem. This approach will equip you with the knowledge to ask the right questions, and the skill sets to answer them.

> "AI IS A POWERFUL TOOL THAT CAN ACCELERATE SCIENTIFIC DISCOVERY AND ALLOW US TO FIND SOLUTIONS MORE EFFICIENTLY"

BACHELOR OF SCIENCE (PHYSICS), MADRAS UNIVERSITY, INDIA >> MASTER OF SCIENCE (EARTH PHYSICS), AUSTRALIAN NATIONAL UNIVERSITY >> PHD (EARTH AND ENVIRONMENTAL SCIENCES), COLUMBIA UNIVERSITY, USA

CHIEF INVESTIGATOR, CENTRE FOR DATA ANALYTICS FOR RESOURCES AND THE ENVIRONMENT, UNIVERSITY OF SYDNEY >> RESEARCH SCIENTIST, NATURAL HAZARDS AND CLIMATE RISK, CSIRO DATA61

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START YOUR CAREER HERE

ENVIRONMENT + DATA + STUDY

UNDERGRAD

Bachelor of **Computer Science**, University of Adelaide

Bachelor of **Data Science**, QUT

Bachelor of **Environmental Science**, Edith Cowan University

Bachelor of **IT (Data Science)**, Macquarie University

VET COURSES

Certificate IV or Diploma of **Environmental Monitoring and Technology**, Tafe WA

Diploma of **Conservation and Land Management**, TAFE Queensland, TAFE SA or Melbourne Polytechnic

ONLINE

Artificial Intelligence (AI) for Earth Monitoring, FutureLearn

ENVIRONMENT + DATA + JOBS

Data engineer
$66K–$133K

DevOps engineer
$65K–$132K

Geospatial analyst
$58K–$107K

Environmental scientist
$55K–$90K

Marine biologist
$43K–$101K*

*Source: salaries according to payscale.com