

SYSTEMS THINKERS IN STEM

A CONVERSATION WITH:



Which systems thinking skills do you use?

#2: Consider the Wholes and parts

Want to understand the changes in the food web at the ecological level the community structure and succession during a season at the community level all the way down to the level of each cell's genetic response to their changing environment.

Maintain boundaries
 Scientists traditionally like to put things in boxes and characterize different components of a system. We have to tie all the relationships together in the greater system to understand the phenomena that is observed.

#9: Identify Relationships
 Melting Glaciers freshen the saltwater coasts of Antarctica. The coast also happens to be the region where krill and whales congregate, seals haul out to rest on land, and penguins live in colonies. All of these big animals eat a small crustacean called krill and krill feast on phytoplankton.

1. What is your role within the STEM community?

I am currently a graduate student at Scripps Institution of Oceanography under the advisement of Dr. Maria Arneret. I co-founded and manage the citizen science project "Ordhyto" which engages tourists in polar research to understand phytoplankton communities along coastal fjords in Antarctica. I do education and research through boat tours and scientific diving. I am a member of many research and women-focused STEM organizations. To learn more about what I'm up to visit me at www.womanscientist.com

What complex problem do you address in your work?

I want to understand how the environment influences phytoplankton in Antarctica. The Antarctic Peninsula is the third fastest warming region in the world with increasing air and ocean temperatures. These warmer conditions have caused some of the glaciers on the Peninsula to melt bringing more freshwater into the marine environment along the coast influencing the types of phytoplankton there. What elements do you need to consider when addressing this problem?

Large scale atmospheric events such as El Niño and the Southern Annular Mode determine the temperature of the ocean as well as air and sea ice cover each year. The water column i.e. physical oceanography and the temperature and salinity change along the coast. These factors can change with melting sea ice on the ocean and melting glaciers on land. Also need to consider all the aspects that govern a phytoplankton such as daylight length, nutrients available, grazers and predators, virus attack, and sinking rates.

How did you get to where you are today?

In high school I liked exploring and thought being an astronaut would allow me to travel to the moon. Astronauts had degrees in STEM so I chose to study biology and ecology in college. I didn't even think I wanted to be a scientist until my senior year. After college I started gaining experience in labs and in the field through various internships, volunteering, and obs. When I went to Antarctica for the first time I fell in love and decided I would spend the rest of my career dedicated to polar ecosystems and oceanography. I decided to attend graduate school to further the opportunities and impact I could have in polar science.

What advice do you have for becoming a systems thinker?

My advice for a high school student is to explore any system you encounter and don't feel overwhelmed by all the information and connections you need to consider. Instead, think of it like a fun puzzle. How do things fit together and feed back on each other? Also, engage with scientists in other disciplines. Talk to many, many other scientists even outside your own interests. This will help sharpen your systems thinking brain and always remember that your personal experiences will provide a unique and valuable perspective that others might not realize. Don't fall into the trap of Imposter Syndrome. Be confident in your ideas and share your thoughts in those collaborative systems thinking settings.