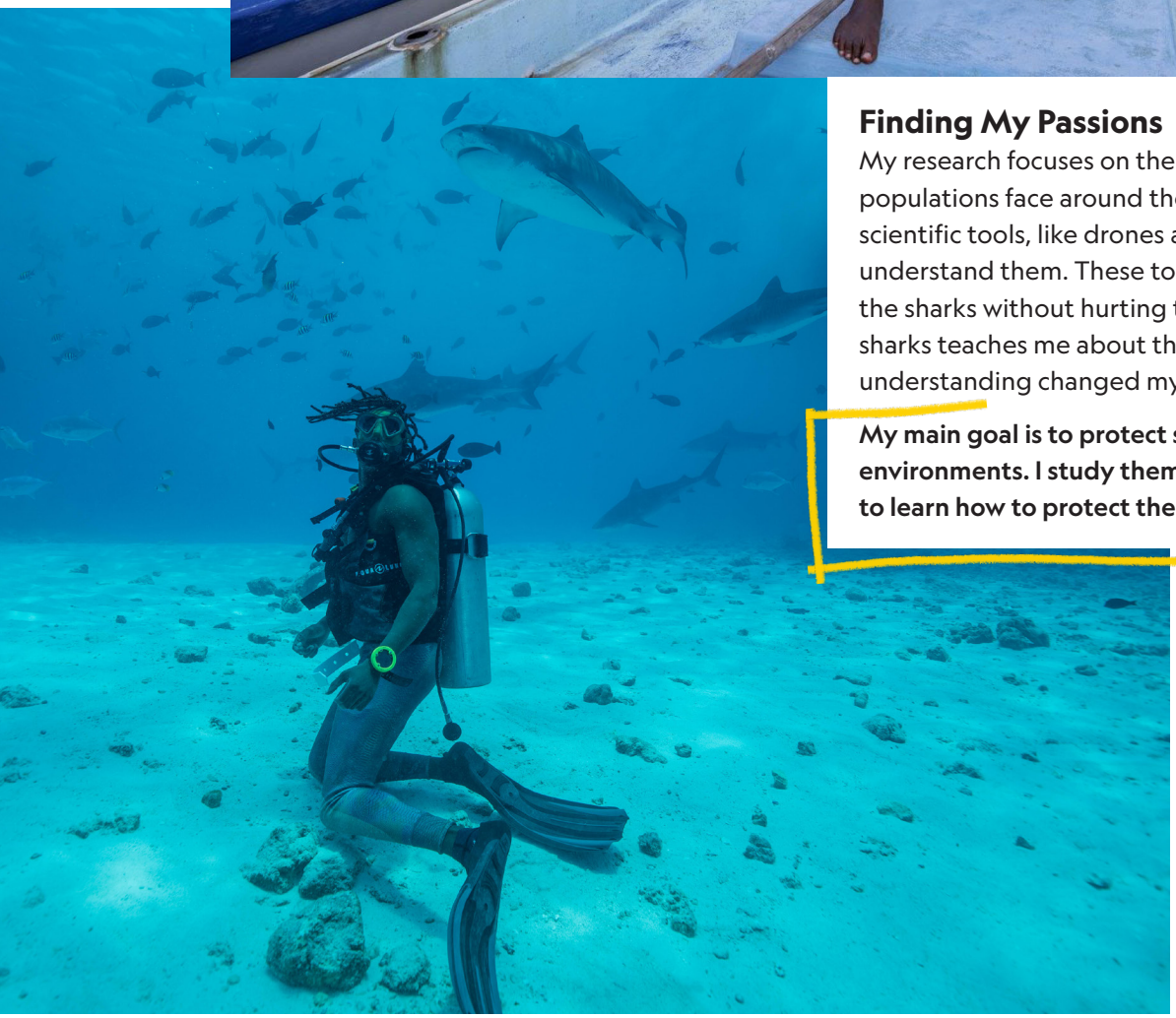
Hi, I'm Gibbs Kuguru!
I'm a shark researcher and National Geographic Explorer from Kenya. I work in the Maldives.



Finding My Passions

My research focuses on the growing threats shark populations face around the world. I create new scientific tools, like drones and robots, to better understand them. These tools help me study the sharks without hurting them. Watching the sharks teaches me about their behavior. And this understanding changed my fear of sharks into awe.

My main goal is to protect shark species in changing environments. I study them in the wild and in the lab to learn how to protect them.

To study sharks I dive underwater in order to see them in their natural environment. It's important to understand shark behavior in order to keep both the sharks and myself safe.
Credit: Siraj Ahmed, National Geographic

Asking Questions

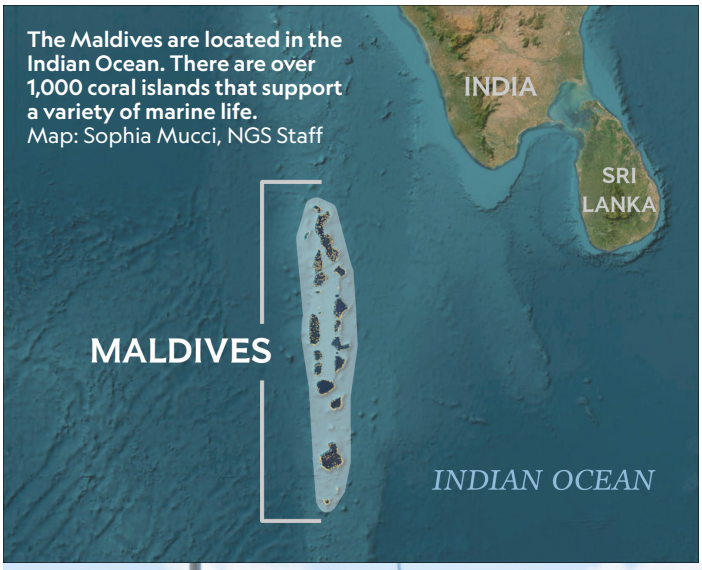
In 2018, I first heard that Maldivian sharks had unusual white spots all over their bodies. At first, I thought it was not related to my work , but my curiosity took over. I discovered that these spots were because of an inbreeding-related problem. Sharks are very sensitive to inbreeding because they live in small communities. I wanted to find these sharks, understand how human action causes inbreeding, and hopefully find a solution.

The Maldives are a tropical collection of islands in the Indian Ocean known for crystal-clear waters, coral reefs, and marine biodiversity.

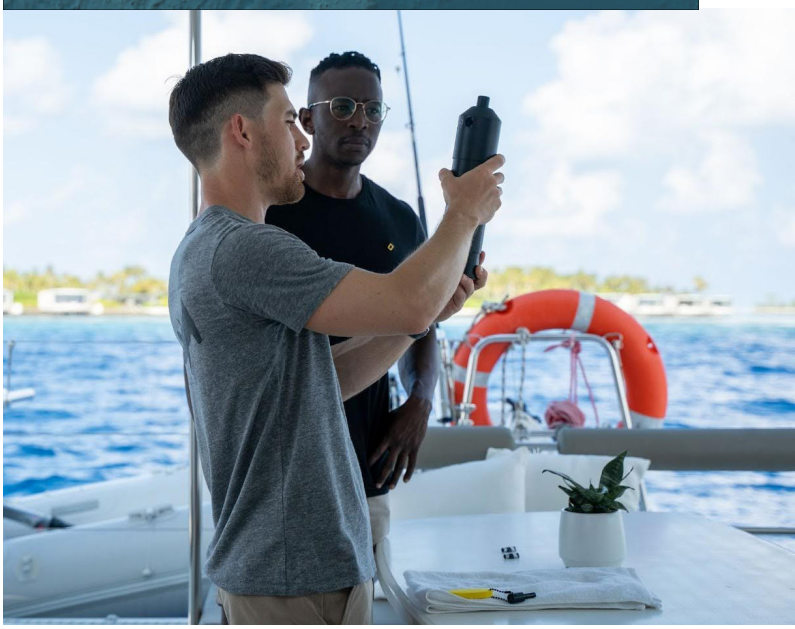
Shark conservation in the Maldives is not simple. Sharks help maintain coral reef balance by controlling the population size of the animals that live in the reef. This helps maintain balance for all living things. Healthy coral reefs also help stop coasts from shrinking because of climate change. Local communities have strong cultural ties to the ocean. They see sharks as a central part of that tradition. Sharks also help boost local tourism and support economic growth. All of these are interconnected. Saving sharks can have far reaching effects for people and the ocean.

I wanted to answer the question: **How can studying the DNA of sharks help better protect them and support the local community in the Maldives?**

Here is one of the inventions I helped create called ATOMM, or Aquatic Trace Organism Molecular Monitor. It is used to safely collect eDNA from sharks without harming them! Each time the shark moves through its environment, it leaves behind a small trace of itself that I'm able to collect with ATOMM. This means that within a single scoop of water, I can get a sample of all the sharks that came through there that day!
Credit: Gibbs Kuguru



The Maldives are located in the Indian Ocean. There are over 1,000 coral islands that support a variety of marine life.
Map: Sophia Mucci, NGS Staff



Here I am with my teammate. We are using an acoustic receiver to track where the sharks are in the water.
Credit: The Ritz-Carlton Maldives, Fari Islands.

environmental DNA

Leading with Empathy

To study the sharks, I collected eDNA with a new device, the ATOMM. The ATOMM is a marine research device with pumps that are electronically triggered by a remote controlled boat. The ATOMM sucks up and filters animal genetic material in the water. This is like when you vacuum hair that you've shed! I chose eDNA because it's a way to study sharks without harming them. I hope to show others how to be understanding of sharks. One way I do this is by using empathy in my study of sharks.

We studied shark patterns to understand how they live and move around their habitat. We also studied the eDNA to understand how shark populations are connected. I worked with a team to invent new ways to collect information without harming the sharks.

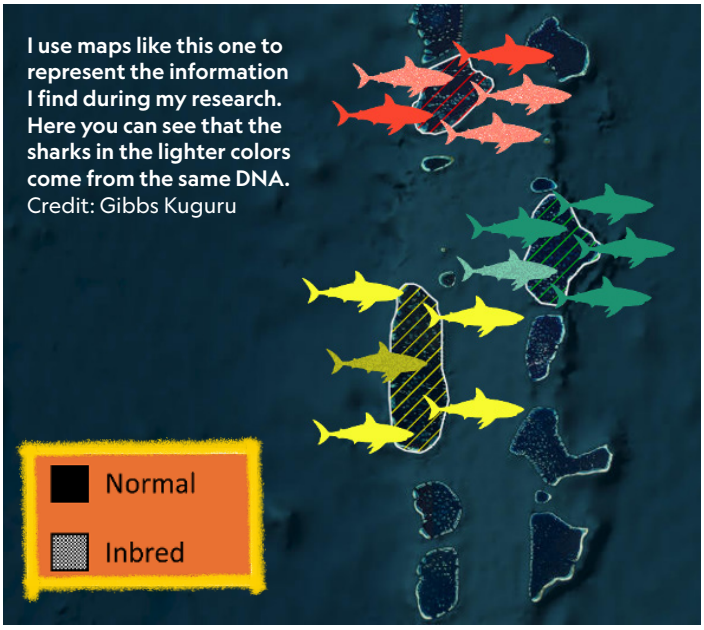
Creating Change

Our research revealed that shark populations are more localized than we expected.They are also more genetically distinct. I discovered that most of these sharks use the islands as their home base. They only leave for short stretches, anywhere from a few days to a couple of months, before returning. When this behavior is repeated over time, sharks form small groups. These communities are different from other shark groups. This means that a one-size-fits-all approach to conservation won't work. We learned that sharks really like specific coral reefs, especially when breeding. We also learned that when humans overfish in these areas, it causes inbreeding. These findings led us to focus on locally managed conservation zones.

It is important to create solutions for shark preservation with others. These solutions should be good for sharks and the people who live near them. To do this, I combine shark movement studies, DNA research, and partnerships with local communities. For the local communities in the Maldives, this approach makes sure that conservation efforts are scientific and also honor local culture.

Globally, my work encourages others to protect sharks. My research gives new information to local policymakers and conservationists. Most importantly, my work helps change people's view of sharks from fear to awe. We've added knowledge to local communities. We also have increased youth interest in ocean science. Scientifically, our findings are helping outline key conservation zones and could be the start of future rewilding efforts.

My research and my stories are helping protect sharks and their environment around the world. I often take underwater pictures to help document these stories! Credit: Siraj Ahmed, National Geographic



I use maps like this one to represent the information I find during my research. Here you can see that the sharks in the lighter colors come from the same DNA. Credit: Gibbs Kuguru

VOCABULARY

Inbreeding: When two animals who are part of the same family mate with each other. Inbreeding can cause harm to sharks and other animals.

Conservation: The management of natural resources to prevent harm and protect animals or wildlife.

Climate change: Gradual changes in all the interconnected weather elements on our planet. An increase in climate change can harm the humans, animals, and plants that live on Earth.

Interconnected: The way people and animals interact with and impact each other and their environment.

DNA: Genetic information inside humans, plants, or animals that help make them who they are.

ATOMM: The Aquatic Trace Organism Molecular Monitor is a remote controlled robot created by Gibbs Kuguru to safely capture and study shark eDNA.

Empathy: The ability to care about the people, animals, and environment around you in order to make the world a better place.

Rewilding: To return an animal or ecosystem to its natural habitat or state.