After the Fact | Scientists at Work: The Art and Science of Saving Mangroves

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TRANSCRIPT

Dan LeDuc, host: Mangrove forests—those trees that grow between the land and ocean—are one of nature's best protectors against hurricanes and tsunamis.

They're like big, powerful sponges, providing a barrier between coastal communities and storm surges—and they soak up carbon dioxide, essential in a time of growing concern about climate change.

In this installment of our "Scientists at Work" series we're meeting a scientist fighting to protect these critical habitats using his camera.

[Music plays.]

For The Pew Charitable Trusts, I'm Dan LeDuc and this is "After the Fact." Mangroves don't always draw a lot of attention, especially considering the important work they do for our planet. But here's something you need to know: Over the last five decades, 50 percent of the world's mangroves have been lost. That 50 percent is our data point for this episode, and it highlights a daunting threat facing marine ecosystems today.

Saving mangrove forests can seem like an insurmountable task, like David struggling against Goliath. But marine biologist Octavio Aburto is working to do just that—and he's doing it a way you may not expect from a scientist. He's using photography to capture the beauty and wonder of ocean life in the hope it will help others understand his research.

In fact, "David and Goliath" is the name he gave a stunning underwater image he captured with his camera that went viral a few years ago. I talked with Octavio to learn more about how he got started in photography and how it influences his current work using drone technology to get a new perspective on mangrove forests.

Dan LeDuc: *[To Octavio]* You are a scientist and photographer, and when one sees how amazing your photography is, you could easily be the photographer scientist. We could

reverse those labels. Tell us how you got started in both science and photography and which came first.

Octavio Aburto, 2019 Pew marine fellow and assistant professor, Scripps Institution of Oceanography: I think the scientist started first, then the photographer.

Because in 1990, I went to study marine biology at the University of Baja California Sur. It's a state in Mexico in the peninsula of Baja California. And when I was a student, I was able to use video cameras and photography cameras to do my science.

My mom asked me what is the kind of job or the kind of studies that I was doing. So I started taking pictures for my mom in order to show her how beautiful it was, the life that I was studying.

Dan LeDuc: What a great audience because you've also said, I know, that scientists must be able to communicate their findings for them to have any impact. You need to be able to tell your mom what you're doing, and if you can do that, you can probably relate it to anybody, right?

Octavio Aburto: Yes. Actually, after I started taking all these images and after several years of conducting science and doing more photography, I really wanted to share all this photography to communicate science. So, after one moment, I started using the cameras to translate my science in pictures or in images that tell the stories that I wanted to tell, for not only my mom, also for a bigger audience.

Dan LeDuc: So much of science—I mean, if it's not communicated to those who can make policy decisions and the rest—is for naught. I mean, it's knowledge for knowledge's sake, but nothing can really happen unless it can be communicated.

Octavio Aburto: I think scientists, we have the responsibility to tell our stories and communicate our science in a different way. So this is what I have been doing in the last 10 years. And so far, in some topics, like marine protected areas or mangroves, I have gotten very interesting results in terms of inspiring decision-makers and society in general to make positive changes to protect and understand these ecosystems.

The majority of my work is in Mexico, but also I have been working in different Latin American countries. For the last 10 years, I have been supporting research and conducting research in the Gulf of California.

We have been studying artisanal fisheries. We have been studying coastal ecosystems and marine ecosystems. But also I have been studying or estimating how good or bad

have been the results of the decisions to implement conservation efforts like, for example, marine protected areas or fisheries regulations.

[Nature sounds and camera clicking.]

Dan LeDuc: That's Octavio in the field, snapping photos along the coast of Baja California Sur in northwest Mexico.

[Birds and insects, with running water.]

Dan LeDuc: One of your most popular photographs is "David and Goliath." Popular in that more than 27 million people have seen it on the internet. We put it on our website, and what you see is this small diver standing on the seabed holding a camera, and a giant—what looks like a tornado of fish called "jacks"—right next to him.

Octavio Aburto: Yes, jacks, it's a family of fish that are very similar to tuna. Different from tunas, jacks spend most of their life close to reefs. And in this particular photograph, we capture a moment within their mating ritual.

These jacks perform this beautiful dance every year when the full moon of October and the full moon of November happen, and during that week these jacks congregate in big numbers. We have counted more than 6,000 of these individuals. And basically, they dance, and they move in these very amazing patterns. In that particular moment when I took that picture, they were creating this kind of tornado so that the fish were moving in a circular way from the bottom of the reef all the way to the surface. And it's almost 20 meters depth. So really, really it's an amazing ritual, an amazing behavior.

And during the full moon of these months, basically, they come to the surface, and they spawn. And this is the beginning of their life cycles. The larvae will be born in the water, and later they will go and find refuge in coastal habitats, like mangroves. And after some years, they will come back to the reef to repeat this life cycle. So it's very, very important for us as humans to understand that we need to protect each of these stages in order to don't disrupt this circle of life.

That picture, it took us three years to take this picture—to have the right conditions, the right visibility.

That picture actually was taken in one of these areas where conservation efforts have produced an amazing resource. This picture was taken in a tiny community that is called Cabo Pulmo, and the picture was taken with the help of a friend, his name is David, and he's in front of a big school of jacks.

And I basically put the name of “David and Goliath” for this image because, well, first of all, his name is David. But I think the image represents the challenges that humans have in order to protect nature. Not only because these challenges are big but also because I think once humans realize that they can really, really make important positive impacts, they can recover marine ecosystems in an amazing way.

Dan LeDuc: You know, so much of your work has been underwater until now, but your new work is taking you up in the air and looking down on the water. Tell us about that.

Octavio Aburto: Yes, I have been working with coastal ecosystems as well, and one of the most fascinating ecosystems are mangrove forests. Mangroves are trees that live in the transition between the ocean and land. These trees evolve from terrestrial plants, but they adapted to live in this brackish water. And actually they use salty water to produce photosynthesis, and they have adaptation to excrete the salt and continue living in these conditions. It’s very stressful conditions, but these trees can live along different coastal areas.

They are very, very important because they protect the shore, protect the coastal areas for many countries, and they produce many benefits for humans. For example, their roots create habitat for many juvenile fish, and also they capture a lot of carbon from the atmosphere, and they bury this carbon in their sediments. So the carbon sequestration that these trees generate, it’s very, very large. Actually, per unit of area, mangrove forests are the ecosystems that sequester more carbon compared with other ecosystems.

Dan LeDuc: And so in a half century, we’ve lost half of our mangroves.

Octavio Aburto: Yes, that’s correct. That is because there are many drivers, or many problems, that these forests are facing. They compete with other economic activities, human economic activities, compete with these mangroves. Like for example, in several countries, especially in the past, the shrimp aquaculture was one of the economic activities that replaced mangrove for shrimp ponds.

Nowadays there are other economic activities, like palm oil industry, that—it’s basically competing and degrading these ecosystems. These palm trees compete with mangroves for resources, for fresh water, for space. So this industry is the one that, for example, in Indonesia and also in many other parts, like Mexico, is removing a lot of mangrove areas. And in certain places, even urban developments, especially tourism developments, basically this industry is replacing mangrove forests for hotel buildings and homes. So, there are different drivers and different problems that we are facing in order to stop mangrove deforestation now.

Dan LeDuc: So do you view part of your role as a scientist to help just people understand the value of the mangroves?

Octavio Aburto: Yes, I am trying to show to society, the general public, but also the decision-makers, that just having healthy mangrove forests, it could produce more economic benefits in the long term than replacing these ecosystems for any other kind of infrastructure. The problem right now is that when we remove these mangrove forests or a hectare of mangrove, we only consider the benefits for one economic activity.

Dan LeDuc: So how are you putting your photography to work to help understand what's happening to mangroves?

Octavio Aburto: Well, I'm doing two kinds of photography right now to understand the value of mangroves.

Right now, the technology that we have with satellite images, even that they have very nice resolution, is not quite the resolution that we need in order to separate between what is a mangrove and what is another kind of vegetation. And actually, the resolution is not enough yet to separate even between mangrove species. Like, for example, with satellite images, we cannot separate what is a red mangrove from a white mangrove or a black mangrove. So, we still need to have better satellite images and probably that will happen in the next five years.

But right now, with the drone technology, we can get that resolution with the drone technology. So we are using drones, and we are using very, very nice cameras to produce this three-dimensional map with very, very high resolution. And using that map, we are creating algorithms to separate between mangroves and non-mangroves and between different species of mangroves. And once we have enough resolution with the satellite images, these algorithms will be used by this other technology. So, in some way, we are using drones until we have enough resolution with the satellite images.

The other way that I am using the images is I am capturing beautiful portraits, beautiful images of these ecosystems, and every time that I have an opportunity to present these images and these portfolios in big auditoriums, or with students, or with young people, I always go and present this portfolio of images.

And the most important thing is that you can take this picture, you can send it to a decision-maker, or, you can post it in social media. And everyone will know what is happening and why all of us really, really should care about what is happening with these problems. So, this new perspective of taking an aerial picture to understand a problem of a forest is changing radically how we are doing science and how we should

or how we are tackling all these problems of mangrove deforestation. So I really, really have hope to change the way that we are doing things, especially in coastal and marine areas.

I like a lot to tell stories. I like a lot to do science. So it has been a pleasure and a commitment basically to create more storytelling related with scientific results and scientific efforts. So I will continue doing that for sure in the coming years.

[Music plays.]

Dan LeDuc: Well, again, professor, thank you so much for your time today, and we wish you continued good luck with all the work you're doing.

Octavio Aburto: Thank you very much, and it has been a pleasure to talk with you and your audience.

[Music continues playing.]

Dan LeDuc: Again, we have some stunning images from Octavio for you to see. You can also take a video tour through the mangroves. Check those out on our website at pewtrusts.org/afterthefact.

And if you like what you're hearing, you can now find us on Pandora, in addition to the other places you find your podcasts.

I'm Dan LeDuc. Thanks for listening.

Female voice: "After the Fact" is produced by The Pew Charitable Trusts.