SOUND SCIENCE BASICS OF BIOACOUSTICS - VIDEO TRANSCRIPT

Hi everyone. I'm Taylor Rabe, a wolf researcher and Conservation Nation's Education and Engagement Facilitator.

Have you ever thought about the information hidden in the sounds around us?

Animals don't just make noise. They communicate, share information, and respond to changes in their environment through sound.

In this lesson, you'll meet an incredible scientist, Dr. Joanna Lambert. Joanna has spent her career learning how animals use sound to survive, connect, and adapt. So, introduce you to bioacoustics and the science of listening.

So, get ready to tune in and really listen because this is where our journey begins.

Welcome to Sound Science: The Basics of Bioacoustics.

Let's take a moment and listen. Before we begin, close your eyes. What do you hear? Maybe birds, wind, insects, distant traffic, a hum in the room. Maybe even just silence. What sounds close to you? And what sounds really far away?

Now imagine this.

What if every one of those sounds carries information, not just noise, but meaning.

So today what we're going to be doing is exploring bioacoustics the sound of life and discover how listening helps us understand the hidden language of nature.

Hi everyone.

I'm Dr. Joanna Lambert, a scientist and professor of wildlife, ecology and conservation biology at the University of Colorado— Boulder.

Life on Earth is constantly communicating, and the question is not whether nature is speaking. The question is whether we are listening closely enough to understand.

I have had the amazing privilege of studying wildlife around the world. In all kinds of situations.

Animals communicate in many ways. Scientists who study sound in nature practice bioacoustics: the study of how living organisms produce, use and respond to sound.

And sound is powerful.

It can travel through air, through water, and around trees over long distances where vision fails.

These sounds form a complex web of information, and together they create something that we call a soundscape.

It's like a natural orchestra where every species occupies its own acoustic space. And when biodiversity declines, that orchestra loses instruments and the soundscape becomes simpler.

So imagine if you were listening to an orchestra and all of a sudden, all the violin players were gone. It would sound different, right?

Well, this is what we're trying to do with the science of bioacoustics; to record and understand the sound and then figure out what is missing.

In this way, listening has become a health check, and we can use all kinds of instruments to help us in this.

For example, hydrophones are used in oceans. Autonomous recording units or ARUs are used in forests, satellite-linked acoustic sensors, and even artificial intelligence(AI) to recognize patterns in thousands of hours of recordings. These tools allow researchers to monitor regions without disturbing the animals in those regions.

So let's explore some of these exciting examples.

The first of these examples is with whales, and I want to talk about the songs of the oceans. And there are fantastic species in the ocean who must communicate by sound. Water has really different properties than air does. That allows for long-distance communication.

Now, blue whales, the world's largest animals, produce really, really low frequency calls that can travel literally hundreds of miles underwater.

Why? Because sound travels about four times faster in water than it does in air. And these calls help whales locate one another in the vastness of the ocean. A place where vision is limited and distances are enormous, and we can use recordings of these really long-distance songs to help with the protection of whales.

What humans do in the oceans can also be harmful.

For example, ships in our oceans create a massive amount of acoustic pollution in the oceans, and when oceans get louder, whales must call louder, or they might not possibly hear each other at all. So scientists use underwater microphones, and we call these hydrophones, to measure whale communication and track how human noise affects their survival.

So by listening, scientists can recommend shipping changes, speed reductions, and protected marine areas. And so in this way, listening helps protect whales, not just study them.

Now let's move into the forest of equatorial Africa.

Chimpanzees one of our closest living relatives, live in really complex social groups. They are highly intelligent and their communication system is super sophisticated. Chimpanzees produce all kinds of vocalizations. For example, pant hoots, that travel long distances to gather other group members. Alarm calls that differ depending on whether there is a threat such as a snake or even another group of chimpanzees.

They also scream a lot and that screaming can signal conflict. Communication is not just about sound, it's about social relationships. Sound and vibration maintain group cohesion and dense forests where visibility is really low.

Different chimpanzee communities use slightly different call patterns and gestures like human dialects.

Listening to chimpanzees doesn't just tell us where they are. It tells us about social structure, stress levels, habitat change, and even population decline.

For example, when logging or human encroachment increases, chimpanzees get quieter, they make fewer pant hoots, shorter calling bouts, and even overall just less sound diversity.

So, what this means is that losing habitat for chimpanzees means losing the sound of chimpanzees.

So now let's move to the African Savannah.

Elephants produce low frequency rumbles. Many of them way below the range of what humans can hear, and we call these infrasonic calls. Infrasound can travel for many miles, sometimes up to six miles across open landscapes.

Why is that important?

It's important because elephant families are often spread out across really long distances while searching for food and water. Low frequency sound waves can travel farther than high frequency. So what this means is that it allows elephants to stay connected even when they can't see each other.

They also send vibrations in the ground. When an elephant rumbles the sound, they create results in vibrations in the soil. Other elephants can detect these vibrations through their sensitive cells in their feet and in their trunks.

So what this means is that they're not just hearing the message, they are feeling it.

Elephant communication overall reveals deep emotional bonds between individuals. So for example, when a family member dies, elephants produce specific vocalizations and gather quietly around the body.

They may touch the bones with their trunks and continue to revisit that site many years later. Sadly, there are fewer and fewer elephants all of the time. Human hunting and poaching increasing numbers of humans in the area have taken their toll.

So by placing acoustic sensors across different elephant habitats, researchers can monitor populations without disturbing them. Listening can even help detect things like gunshots or poaching activity in real time.

So, in the case of elephants, listening is not just about understanding their sociality and their intelligence, it's also about protecting them.

But here's the most important part.

You don't need advanced technology to begin listening. You can begin right now. When you sit quietly outside, you are collecting data. When you notice fewer birds than last year, you are observing change.

When you map sounds, you are building awareness.

When we truly listen to whales and chimpanzees, wolves and birds, we are participants in a larger conversation.

But listening is not just a scientific tool, it's a way of relating to the world. Life on earth is constantly communicating. And when we learn how to listen, we become better scientists, better stewards, and better humans. And all of this enriches how we understand our place on earth.

Learn More About Dr. Joanna Lambert

I grew up just always loving animals. I could sit for hours just watching a bunny rabbit, for example. When I was a girl, the way that I was raised and my circumstances were such that I had no idea you could actually make a living studying animals. And when I figured that part out, there was no going back.

I then just took that passion that I'd had as a young girl and poured it into my life's work, right? I had to work really, really hard throughout all of my schooling. I worked two or three jobs on the side, and I just hung in there. I was tenacious.

And at the end of some of my schooling, when I was finishing up my bachelor's degree, a professor approached me and said, Hey, you know what, Lambert? You've paid your dues.

Would you like to be a field assistant on my project in Africa? And there was no going back.