

## Observing Changing Recreational Seascapes in Hawai'i

**Laura Thompson:** I'm very pleased to introduce Dr. Noelani Puniwai as our speaker, today, of the NCCWSC webinar.

Noelani is currently serving as a post-doc in geography at the University of Hawaii in Hilo, where her interests lie in working with communities and across disciplines to progress the health of the people and aina kai, which is the Hawaiian...

[silence]

word for "environment." As a native Hawaiian community member and science educator, Noelani wears many hats and tries to facilitate the communication of knowledge between scientists, local communities, and management agencies.

Her family name means surrounded by, or all about, water, making water her purifier, her connector, and her kuleana, which is the Hawaiian word for "responsibility," to conserve and protect from the tops of the mountain to the depths of the sea.

She grew up on the banks of the Wailuku River and diving in the tide pools of Kapoho, where she continues to raise her three children today. I would like to welcome Noelani for her talk, titled Recreational Seascapes - Integrating Human and Mechanical Observations on Hawaii Island. Thank you so much, Noelani.

**Noelani Puniwai:** Thanks for having me today. I wanted to start off my presentation with just a little snap of who I am. That's why I wanted to have the webcam showing. A lot of my presentation is going to really focus on face to face -- he alo a he alo -- how we relate to each other.

**Noelani Puniwai:** There you are.

**Noelani:** Good morning, everyone. Thanks for joining us today as we talk about seascapes. I'll probably start this presentation off more as a conversation.

In knowing that a lot of you might not come from places with oceans, places with marine resources, it's pretty interesting, just when I think of everything that I am talking about today, in the ways of seascapes, of landscapes, of riverscapes, of any part of the environment that you can relate with, and the people that relate to those places.

Recreation is a very broad term, and every place has its own type of personal recreation, and recreation specific to that place. If you start getting lost in figuring out how does this apply to you, just start thinking of the communities that you work with and the recreation that's available in those areas.

I'll probably try and bring my web camera on again at the end, when I can ask questions. For now, I'll switch to my presentation. If my audio gets hard to hear, please let me know as well.

Thank you.

[pause]

**Noelani:** I titled my talk Recreational Seascapes because I'm looking at the ocean and how people relate to the ocean.

Recreation is a very interesting word, because it has a lot of different importance to it, which I don't really go into in this talk, but I think it's a good way of understanding how people normally spend their time on place.

I need to give a lot of thanks to the people that have been helping me with this information and this research. My professors Steven Gray, Chris Lepczyk, Craig Severance, and a lot of the students who have also been a part of the program. So aloha Cherie, Stephanie and Danielle from this past summer.

I'm going to be sharing with you a little journey today. I spent the last few years listening. I want to learn more about the connection that people still have today with our world, with our oceans, with our environment. Both what drives them in their interactions and what they understand about it.

I think the solutions for our ability to take care of our resources, to prepare for climate change is in these people still connected to the ocean, to our resources. So I listened to the watermen, the souls who experience the true ocean.

I listened to the ones that have provided their livelihood from the ocean's generosity, such as Uncle Mitch, who is a commercial fisherman his whole life. I listened and asked questions of those who've spent their lives immersed with the ocean's beauty, within its depths.

Many of these fishermen come in all ages, all genders, all nationalities. It's that relationship to the resource, however, that's very interesting to me.

From their stories, from their understanding, I try to understand how they mentally model how they describe the ocean, the resources, because through understanding their worldview, I feel that we can acknowledge and integrate their information about our resources to better manage together.

Most of my work has been taking place in the Hawaiian Islands, and then particularly on the Big Island, Hawai'i and in its little bay called Hilo Bay.

But before I get any further, before I start influencing your perspective, I would like each of you to take a few seconds to close your eyes and envision in yourself a seascape. What comes to mind? Is it an imaginary one? One from a movie? Is it your favorite memory? A place you want to go?

What comes to mind when I say the word "seascape," because as you can tell, it's a very personal image. I can't predict what's in your mind when I say the word "seascape," and neither can you understand the seascapes that these people I've interviewed understand.

Because even though I've only started my conversation with them, I still have so much more to learn from them each. Why does it matter what this definition of "seascape" is? How does it relate to what I've been studying?

And then more importantly for this climate change series, how does studying the seascape relate to climate change?

If you go to the word "seascape," you'll get lots of images such as this. Some might be cartoony. Some are pictures or paintings of the coastlines. Depending on where you're from, you may think of this when I talk about islands and areas of interaction between the ocean and shore.

Everyone will have a different image, based on where they're from and what they're familiar or unfamiliar with. Seascapes tell about a particular place. They can tell us what's valued, the location of things, what's important to people and where they are in the world.

Recently, people have used it geographically to understand, denote and manage spaces. Some people see the simplicity and the quantitative dimensions, but there's something core at the heart of a seascape and what's missing from these images is us.

A more common representation of a living seascape is a cultural seascape. It shows us people's interactions with the ocean along the coastline, their activities, their priorities. I'm one of a few researchers internationally looking at seascapes and understanding how the calm seascape can help us in our management efforts.

However, universally across all of our research, people are a part of the seascape. The research of seascapes is still very immature compared to that of the landscapes. Yet we in the Pacific, we here in Hawai'i, we are people of the ocean, and we understand seascapes. How it changes based on ocean conditions and cultural perspectives.

What we call these are "coupled human-natural systems." Many of you guys might be studying coupled-human natural systems. Through that, we recognize that a seascape involves the broad range of meanings that individual and social groups place on the environment.

A seascape, it shares our identity. It talks about interactions that people have between and among themselves, the communities, living and non-living, in a place. You can see that seascapes is much more complex than just a painting of the ocean.

Sometimes when we hear a word for so long, such as the word "seascape," you forget the context that the word can be used in is dependent on the discipline that you're in.

I really like the writing of Anita Maurstad, who writes about Nordic oceanic communities. She states that when fishermen no longer use a seascape and perpetuate their knowledge, spacings and understanding of local conditions, that the seascape will disappear. It will turn into a sea wilderness.

The sea must be seen as a cultural space in our worldview. Otherwise we return to the past, where for centuries, the biological resources of the sea seemed endless. A well-respected component in Hawai'i, she said that culture anchors a people to a space based reality. So the culture is what connects you to a space based reality, in place and time.

We cannot talk about places...we cannot talk about environments, what they're like now and how they might be in the future without knowing the culture of that place and realizing that that is an interconnection.

Therefore, we see that natural resource management, ocean research management, all of these are really managing multiple uses and meanings of the ocean.

With major funding from the Pacific Islands Climate Science Center and a fellowship through the Hawai'i Mellon Fellows and the Kohala Center, I've been trying to understand how using the perspectives of seascapes can help elevate our understanding of the effects of climate change on local communities.

The Pacific Islands Climate Science Center and many of the other climate science centers want to understand the implications of climate change on people here on Hawai'i and particularly native Hawai'ians.

My approach to this is to understand what resources and places are most vulnerable, what processes may be affected and how we can prepare our communities and increase our resilience. I've been working on this by understanding our climate patterns have been like and how these are known processes.

I'll show you some of these examples with two projects that I've currently wrapped up. Recently published in "Human Ecology" is the communication of ocean current knowledge and how we've learned about it through human observations.

"Ike i ke au nui ke au iki" is a Hawai'ian saying that I've been using in my research. This saying itself says, "Look at the big currents, look at the little currents." It was said in a saying as someone came on a journey being judged. They ask to be looking, look at the big picture. Look at the little picture.

It ends with the saying, "He alo a he alo," "face to face." Look at everything around you face to face. I like this saying because it's very deep. It has a simple literal translation and it has so much implications within it if you start thinking of how do you look at a situation? You have to really look at it through multiple perspectives, deep and little.

Monitoring and understanding our ocean and how it changes requires fully knowing the relationship between the physical and the cultural dynamics. I'll explain more what I mean by these.

The social cultural seascapes, the physical and the cultural, they're changed together. I simplify them by studying them on two main axes. I feel that only by integrating these can we really understand the different ways in which we can understand and describe seascapes.

We can think of the physical seascapes, the variables that scientists use to characterize environments. We can start with simple features such as temperature or substrate, and proceed to more complex understandings, integrating many variables together.

We use mechanical sensors such as used in the marine environment to monitor wave regimes, stream flow, rainfall, all these different systems that managers use to predict the effects and implications of climate change.

On the opposite side, we can look at the cultural seascapes and how I use human observation systems to understand the cultural seascape. Because objective data alone will not predict society's response to a changing climate.

If we want to understand how climate change is going to affect us in the future, we need to understand the cultural implications of change. This cultural seascape...

[pause]

...incorporates the use of...when using the human observation system, we get to see what's shared by recreationists, fishers, ocean watermen, to see how they internalize climate and environmental changes important to their interactions with the resource. So what did I find out?

I interviewed people of all ages and associations that were recommended as experts in the ocean. These experts included fishermen, paddlers, life guarders, surfers, sailors. Out of those 30 people I interviewed, I characterize their ability to communicate their knowledge.

This analysis isn't really looking at what they shared. It's talking about how they shared and their ability to share this knowledge.

The first quote you can see shows a limited ability to communicate ocean knowledge. "I notice when the river is really strong when the high tides coming out," yet maybe they weren't able to articulate much more than that.

Going up the scale, there are some people who say, "You know, I really don't know it that much, but I do know how some things work around here." They might be able to drive or to talk about it.

Yet we also had people that were very detailed for their information, either spatially or quantitatively, such as this life guard. He was able to quantify his information of how the currents move in a particular location.

What kind of questions were they trying to answer? A basic question I had is "What is the scale of the human observing system?" What are these things, these variables that they understand? Then how does it compare to the physical system, the information that we get from these mechanical devices?

What we see is...this slide's got a lot of information, so let me walk you through it. On the left side here, we have a picture of Honoli'i Bay. Right here is a river coming out and the ocean coming in from this side. Each different color shows a different surfer's interpretation on their maps of how the currents work in a place.

On the right side, I've kind of summarized all the information that ocean people talked about in regards to Hilo and Honoli'i Bay. They talk about the scale of map that they chose to share their information on and the number of maps that were shared at that scale.

So the surfers, the sailors, watermen, all of the people that are interviewed were given maps to draw on, and they were interviewed. It was all audio transcribed.

As you can see that the maps they chose from, they had a scale of just five different maps to choose from, yet people in each discipline, no matter if they were a surfer or a fisher or a paddler, they all chose maps at the 1 to 5,000 scale, which is the same scale as that shown on the left here, to talk about their information about the ocean.

That in itself is really interesting, because it hasn't been documented before, what is the scale that humans operate on the seascape with?

Of course, there's more work to be done about this, but this 1 to 5,000 scale, it seems really important. It's not the smallest scale that they were given. They were also given a scale of 1 to 2,500, yet very little people wrote or described the ocean on that scale.

Another way of presenting that same map is on the left here. You see everybody's individual interview, because each person was given a blank map on which to draw on. Then we geo database and digitized all their information. We compiled it with their interviews and all their demographic information.

What you see here is that even though we can integrate all their information into one map, what we're doing is losing those individual stories that we see on the left.

Because those individual stories are showing different variables and different things that are important. Different functions of the ocean for each person.

To really get a compiled map on the right, it probably isn't very feasible to just add up everybody's layers together. Another way to show this, on the bottom right you see what Hilo Bay looks like. Where did my little pointer go? Down here is Hilo Bay, this light black line along the coastline. We did the same thing with this one.

On the left if you look at them, you kind of think that mostly people are talking about the same currents in the same places. That's the stories that come out. However, when you integrate them all together, that's not really applicable to showing how their information is able to be seen.

To talk about it in one other way, we created a graph to show the spatial and temporal scales in which they shared their information, and the spatial and temporal scales that are available from mechanical devices.

In gray, you see the scale that the high frequency radar and the different models that create output by . In the blue squares, you see the outputs of scales that the ocean expert watermen talked about in their interviews with us.

What you see is, is there not really an overlap with the majority of the fishermen and the surfers and the canoe paddlers in the water with information that's available from the mechanical devices.

We see that images needed by most of the watermen on the ocean is not provided by the scientific instruments. However, the instruments, the information may be available on these people on the land.

We know that knowledge exists. It's just in different formats. What we need are people with different skills to bridge these divides. We need researchers that can talk to the watermen, the people on the ocean, who understand the ocean...

[silence]

...and who live in them. In the second project I did, I tried to understand what are those important variables and how can they be used? How can we really integrate the information from these mechanical devices with the human systems?

In the slide before, I showed you how machines could be a little gap between the connection of the two. So, instead, I tried to find an act, a process, that would make it a little bit more easier to integrate these two systems together. I came up with the idea of surfing, because surfing, as we know, surfers all have to learn their ocean to be able to participate and act.

If they don't understand the system that they're participating in, then they won't be able to surf.

We also know that surfers are amazing in their ways to follow the oceanographic and meteorologic data. They are scientists. They look at the wave flow. They look at the wave period. They understand the wind flow. They use all of those to predict in their minds how the surf is going to be like on that day.

So what is surf? Surf quality -- that's how we kind of define the word "surf" -- is defined as not just the dynamics of a breaking wave, but the result of waves interacting with conditions on the shoreline, physically and socially, to create surf.

The work done in Australia, New Zealand and California all show the same thing, that surf quality is just as important, the social conditions of a site, not just interactions of the wave on the shoreline.

This is key to understanding the different measures of surfing and how people rank surfing. To understand that it's just as much on how they perceive it. It's their value judgment.

To think about it in another way, you can think that the social conditions of the site is, "Is it raining today?" Maybe, "Is it drizzling?" How old are you? If you're 12 years old and you're out there with your five best friends, does it really matter how big those waves are? Not really. You're there with your best friends. The waves are epic.

What if you go after work one day, and the waves, again, are one to two feet. They're nothing. But you had a bad day in the office. And all you need is some time on the ocean. All of those things interact with your expectations of what is good surf. Defining surf, therefore, is not just a physical water quality and wave conditions, but it's also the social conditions of that site.

The overlying question is how do surfers and scientists understand the trends in surf quality? If we're trying to understand how is climate change going to affect a place, how is it, based on those conditions, let's try and see what the local people also think about those conditions.

I surveyed surfers at Honoli'i and asked them, "What is good surf? How was surf in the past? And what are their predictions for surf in the future?" based on different scenarios that I presented them with.

I compared their information to scientific data that has monitored the coastlines. This information includes graphs of climate and ocean conditions which were created and presented to them. We also included climate predictions, so how is the climate expected to change in these areas?

Then socially, we also tried to understand how much people and what types of people have been going to the ocean over time. We administered a survey with about 104 questions to over 100 surfers in the winter of December and February of 2014. It was an anonymous survey, and we approached all willing surfers above age 18.

After about 75 and 80 interviews, we kind of reached a peak in which of the adult surfers on site had been surveyed. The survey took about 20 minutes in length, and it was really fun to engage with the surfers. They really liked taking the survey, although it was really long.

But more than that, they liked to engage in the ideas that we were asking them, which is a good reason to include surfers in your study in the future.

What makes good surf? That was an easy question for surfers to understand. As you can see in this left graph, we asked them what direction do they love the swell to come from at this particular surf break in Honoli'i. A majority of the surfers said they loved surf that comes from the northeast direction.

About 15 percent of people also like surf that came from north-northeast and east-northeast. It was easy to define as a group what conditions make good surf.

Same thing on the right. The graph on the right shows you wind direction. I asked them the question if they like surf offshore, onshore and how strong do they like the wind? Almost everyone liked the graph on the top left. They love offshore wind at zero to five miles an hour. That was a resounding...almost half of them, 88 percent of all the surveyors.

Similarly, if you asked them how the surf is like when it comes from a particular direction, so getting a little bit more detailed information, you can see that on the left here, this A direction, surf that comes from the northwest direction, is pretty flat.

They were asked to rate the conditions of surf on a scale of one to ten, from flat to epic, using terms that they can understand. However, if you look at surf that comes from C, from the northeast direction, just as we asked in the previous question, you can see that the surfers really like the surf that came from this direction.

However, in general, surfers did not observe any trends in the data. They're easily able to define perfect surf conditions, yet they weren't able to define any patterns in the surf conditions over time at a single place.

All of the answers came back normally distributed.

What does the scientific data look like? What we find from mechanical observations are that most of the qualities that define surf quality are decreasing.

Here's an example of stream flow and rainfall at that same river here in Honoli'i that comes and helps create the surf break. These are questions that the surfers said were very important in making good surf on site, yet we can see that over the past 30 years, we've had a significant decline in both stream flow and rainfall at this site.

Similarly, if we look at the wind conditions, mean annual wind speed and the mean annual significant wave height, we can see that these have also both been decreasing over the last 30 years. Of course, we all know that wave height has a significant influence on surf conditions.

For the last part, one of the other variables that we graphed was the swell direction. What direction have the swells been coming in? It looks like over the past few years that most of the swell direction is coming from the straight east and not from the northeast. We can think about how this is going to change the conditions in the future.

One of the last conditions which most surfers didn't think that sea level rise had an influence in the place such as a stream bed, but we can tell them that the sea level has risen over the last 100 years in Hilo Bay, and it's expected to rise at a much faster rate in the future.

What did we find from this? How do surfers and scientists understand trends in surf quality? Well when we asked the surfers what was surf like in the past, both physically and socially. First, physically. How did they think surf was in the past? They think it was great. There's always good times. Always crappy times.

That was pretty easy. It was pretty redundant. If we ask them over 5 years, 10 years or 20 years, how has the surf changed, none of the surfers were able to see a trend in surf quality at the site. However, I think more than a shift in baseline, I think this has to do with the fact that most of the surfers have seen the social conditions at the site change just as much.

When they started off surfing, they had a different group of friends. They had a different group of people that they engaged with on the site. The conditions of the site were different. Thirty years ago at Honoli'i, there was a lot of sugar cane bagasse. The water quality wasn't very strong. The site conditions, it was a jungle to get down to the surf break.

Nowadays, it's more of a park. A peaceful place. A lot of family members. A lot more female surfers in the water. The surfers talked about these changing social and physical changes in the place. They say that nothing's really good or bad. It just changes, and that's what they expect at that site.

Then when we gave them forecasts of the future, like in the future, we expect in Hilo to have more sunny days, which is very different from our past climate. The surfers also see the information, the social conditions in those forecasts.

They think, "Well, you know, sunny days usually means flat conditions...it means that I'll probably want to go to the beach more. Maybe I'll take my kids or my grandkids."

So it'll be a plus for some variables and a negative for other variables. It wasn't feasible for any of the surfers to separate the physical and the social variables in their predictions of how surf, climate change might be affected.

Then the scientific data seems a lot more straightforward. All the conditions that create good surf have been decreasing over the last 30 years. It isn't just a recent trend. It's been going on for a while.

When we talk about what kind of changes we can predict in the future, a forecast, again, we see that the forecasted conditions for this site are less wind, less frequent rainfall, a little bit more squalls, but once in a while we're supposed to have more storms. Storms bring better surf conditions. That's kind of why the surfers were a little confused.

Socially we see that the amount of surfers at Honoli'i have been going up two times, yet there has been different types of dynamics with those increases. So we see more paddle boarders, we see more boogie boarders, we see a lot of younger kids.

So it means that the social conditions on site have been changing and adjusting along with the physical conditions. But it's not something we can easily separate from each other.

In summary, we can say that the spatial scales and ocean conditions important to surfers can be modeled perhaps by some of the mechanical devices that scientists have. Yet to understand them, we need to understand the social side of it.

We also found out that we were able to map the spatial scales that were important to people. We could tell that one to 5,000 map scale, which is a pretty good understanding of the coastline...

If we want to go and do further surveys in the future -- such as I'll be doing this coming month -- we know what map scales are really important to the surfers, watermen, fishers, sailors, and are able to try and help them explain and communicate their information to us on a scale that's easy for them to understand.

We were also able to witness the changes that they've seen over time. When you interview people in a place, you're looking at the same seascape. You're looking at those conditions and you're mapping them with them.

Understanding the variables that are important to people is the only way that we can understand how climate change will influence their actions into the future. We can't predict what their actions are going to be like based on quantitative data alone. We need to understand the social conditions that they interact with.

The integration of both human and mechanical observations ensure that multiple systems of knowledge are included and valued, but understanding how they have been integrating this information through time and how they're expected to integrate it into the future helps us predict and prepare managers for a new reality.

A quote by Doctor Aluli Meyer, "The experience of the world is different from how you experience the world, yet both our interpretations matter." I think sometimes we get stuck in the idea that the data has no value to it, outside of the quantitative numbers.

Yet it does. The way people analyze that, integrate it and internalize it, is different for each person. Just as in the beginning, I talked about what is your seascape? My inability to understand what your seascape in your mind...creates a barrier to our connection.

It's only through relationships and face-to-face, working in our communities, working with the different social conditions that are around us, we'll be able to bridge that barrier and start communicating in a language that both of us understand.

The surfers work on the ocean. They observe different variables on the ocean than the fisherman does. Even though I lump them all as watermen, they each define different variables that they understand on the ocean.

The scale of the beta that we create for them and then ask them for input on, maybe at such different scales that it's not applicable for their information.

The mechanical data that we have answers questions about their characterizing of the dynamics. It's all relevant to a question, all the answers, but the human observing system. They only understand things that are relevant to their activity.

They understand what processes need to be included in a certain place. They're not trying to understand a question, they're trying to understand things relative to the activity that they're doing on the water.

So both of these systems have different processes and are practical for different reasons. Understanding that will help us create resilient communities. By recognizing that everybody has a different world view and that together, we need to understand how people relate to places to therefore understand how to manage them.

That is how, I believe, we can create resilient communities. As I wrap up my presentation, I ask each of you, how do you bond? How do you relate to your place? How do the communities that live in your place, biological, plants, the elements, the people on the landscape, on the seascape, how do they relate to the aina?

Only by understanding those relationships can we support their resilience. I believe that to address climate change, we need to see a spiritual and cultural transformation. When I started on my path research over 20 years ago, I was like many environmentalists.

I'm a child of the '70s. I had the book, "How do you save nature" and I thought that understanding science, I would be able to save the world. Only through realizing that to truly have an impact in our work, we need to practice and preach aloha aina.

We need to understand how people are connected to a place and we need to understand the relationship that they have to that place. We need to love the places we are from. Only by loving something can you truly try to work to create it, to capture it, to love it, to make it succeed.

You have to nurture these places and these places include the people that live upon them as well. It's not just the conditions, the processes of the environment.

That transformation entails moving beyond process and into our own awareness of how we relate on the landscape to practice, relating to these seascapes, to these environments, can we awaken ourselves and make it accessible and understand what each place means so that it can be resilient.

With that, I'll take questions from everyone. Again, my name is Noelani Puniwai and I gave my email. I'm always available for questions and any other kind of information that people might have.

I leave you with this picture of my children because as I raise my children, I want them to navigate their future. I want them to understand and be pili, be connected to the future of their ocean.

Understand what kind of processes and how they'll be able to understand it. I'll take questions at that.

**Ashley Fortune Isham:** Excellent. Thank you very much. As Noelani says, we'll be opening the conference to questions now. Yes, Hawaii is an island isolated from a lot of what goes on in other places. Does the isolation affect the political perspective of the surfers and residents?

**Noelani:** Interestingly, other people who study surfers...I recently attended a conference on tourism and recreational values. People who study surfers in Maryland, in California, in the Philippines and Thailand, they all see things very similarly.

All of our demographics of people. The way they relate to the ocean, seems to have a very similar effect across. I don't think our isolation really affects us. I think surfers themselves are unique but they're not unique to Hawaii alone.

As far as the residents go. I think the residents of Hawai'i are much more multi-cultural than you think of. I think our demographics have been changing such that less than half of the people who live in Hawai'i currently, their grandparents lived here.

We are becoming a much more global community. However, what drives a lot of my research is understanding how people's relationships with the ocean changes through time. It gets me really sad to understand that some people might be losing their relationship to the ocean because that is what has made us unique as a people here in Hawai'i. Thanks for the question, Ashley.

**Ashley:** That came from Kay. I'm just wondering, something that I've heard recently is, as natural resource conservationists and professionals, it's very hard in this changing environment to keep hope alive and to keep a great perspective versus having kind of more of a doomsday attitude.

I'm just wondering if you have any specific recommendations or anything that you do in particular that really helps you keep up your spirit and to pass on hope to others.

I heard you mention that you may have a bad day at the office and some people run down to the ocean and jump in but what are some other things that you have?

**Noelani:** I think as I've started to look at climate change effects on people, a lot of it are these assumptions that we won't be changing along with our environment. Yet, we will be. We'll be adapting at the same time as our environment adapts.

That's something that's really hard for us to understand. It's easy to project sea level rise in 100 years. It might not be easy but they've been doing it for a while, yet it's really hard to predict how us as a society will be changing at the same time.

I think this new generation that's coming up underneath us, they have a very different perspective. Some of them see the dooms day but some of them see the shining lining. They see that as long as they continue their connection with the environment, as long as they're able to feel the world moving beneath them, they're the future.

I think that's something that we each can't forget. We tend to forget it. The more we look at data, the more we look at numbers, the more we're stuck looking at these processes in a very flat, single-dimensional way.

If you get out into the environment, you understand how things change. You feel that and by feeling it, you give yourself hope. I don't think I've gotten very discouraged by the fact of climate change.

I think I try to do everything I can to decrease my impact on the environment yet I feel like this earth will continue without us. It will always survive and it's just how we adapt to it that will change. The only way to adapt to it is a positive attitude.

By continuing our relationship with these places. As Anita Maurstad said, "If we don't feel these places, if we don't understand them, then they become valueless. We have no connection to them."

That, I think, is the scariest part of it. I think staying hopeful is pretty easy as long as you go out there and you see the beauty every once in a while. Whether it be snow or rain, sunshine.

**Ashley:** Excellent. Thank you. Then we have a question coming in over the phone from Jim.

**Jim:** Hey Noe this is Jim. I had a question about when you went out and did your interviews. Did you get a sense from people, how they would value the impact or rate the impact of climate change versus other stresses on the environment, particularly things like over-development and crowding the beaches and that kind of thing.

**Noelani:** Definitely. I think that idea of scale, I didn't talk about it too much today but the scale of impacts and the scale that the surfers understand definitely vary, such as, you know the decrease in stream flow and rainfall events, compare it to a large hurricane or semi-hurricanes that we've come through, have a total different impact.

That ability of every storm coming through, to give them big surf, negates the fact that the other times it might be pretty small. Same thing with the water quality itself.

I think they understand those longer term impacts of erosion, they understand how tsunamis affect them and all those things seem to have a much larger impact on a site. The ending of the sugar chain in Hawaii had a huge impact on surfers.

That's something we would never have been able to predict but most of the surfers talk more about the impact of those kinds of things, erosion, urban development upstream that also leads to different types of pollutants in the water.

They talk about those things much more than the fact that we have less wind-flow today.

**Jim:** Thanks.

**Ashley:** Excellent. Thank you. I saw that Kate Q was typing as well.

**Noelani:** I can see her question. Kate Q's question is, "How do you assess the connection to the place?" There's a couple of different variables that we've been using. I've been trying to integrate things from the recreational literature.

There's a lot of connection to place literature out there that exists as well and it's interesting to note how a lot of these scales have changed through time.

Most of the surfers that I interviewed, they were given questions on a 10 point scale. In my case, I was trying to see if they were able, if the people more connected to the place saw things differently, observe the variables of the place different than people who might not have been as connected to the place.

For this site alone, at Honoli'i, I wasn't able to find anybody not connected to the place. That was based on very standardized questions in the literature. They ask different people...I'm trying to think of some of the questions that they ask, or that we ask in the survey.

We ask them, if you aren't able to come and surf at a particular site, how much would that impact you? We ask if they were to choose from different sites, how is that different?

Very similar, like I said, the questions that I ask are standardized questions and the people who are asked the same questions in Maryland had very similar responses. Surfers are really connected to place.

Those are different than the interviews I did with the other watermen. The fishermen and the sailor. Those people, I didn't exactly assess their connection to the place. Their connection to that place was assessed externally by their peers because they were all identified through a snowball process, to understand who are the experts that really know this place?

By being recommended, it's seen that everyone around you in your community understands that you are of this place and you know how it works. It's very interesting how some of those people are in their 60s and 70s.

Some of those people are still in their late 20s, very young individuals, yet the community around them recognized them not only for their knowledge but their ability to understand the processes that are important in that place.

That was done by a peer review process. There's a couple of different techniques that we use.

**Ashley:** Thank you. I'm just wondering if anybody over at the Reston office had any questions that they wanted to ask.

**Laura Thompson:** No, I think we're good here. Thank you, Ashley.

**Ashley:** Excellent. Then, Laura, while I have you, did you have any last minute comments that you'd like to pass along?

**Laura:** I would just like to thank Noelani for giving this presentation and thank you to the attendees. Please join us next time for the NCCWSC webinar. Thank you.

**Ashley:** Thanks, Laura. Then Noelani, any closing thoughts for you as well?

**Noelani:** No. I just encourage people to really start thinking outside of the box as we go into inter-disciplinary work and really understanding how our climates are changing. Just truly understand that the climate will continue to change as we as a people need to change with it and understand our relationship to this place.

**Ashley:** Thank you.