

Stephanie Showalter Otts:

Okay. All right, Lourdes, you can kick us off.

Lourdes Carreras-Ortiz:

Thank you. Okay, so good afternoon everyone. Thank you so much for joining us for the second of our 2023 webinar series. My name is Lourdes Carreras-Ortiz and I'm an Ocean and Coastal Law Fellow for the National Sea Grant Law Center.

In today's presentation, we will be hearing an introduction from Ruperto Chaparro, who is the Director for the Sea Grant of Puerto Rico, and the main presentation by Mariana León-Pérez Ph.D. about sargassum influxes and its ecological effects. Before we begin, just a few quick housekeeping notes. We do have everyone on mute right now to cut down on background noise. Feel free to use the chat box anytime if you have questions. There should be plenty of time for a Q and A at the end of the webinar, but we will also try to answer questions as we go along. If you have any technical issues, I'm not sure if we can help, but you may private chat with Lauren Fremin, who just spoke about the recording, who's also the National Sea Grant Law Center's project coordinator and the webinar host.

I also wanted to let everyone know, as Lauren mentioned, that the webinar is being recorded and we'll post it to our website as well as soon as we can after the webinar. It usually takes a couple of days to get the transcripts and captions and everything finalized, but be on the lookout for an email about that and a posting to our website. For anyone in the audience who might be new and not know much about us, the National Sea Grant Law Center was founded in 2002. We are housed at the University of Mississippi's School of Law and our mission is to conduct legal research, education, and outreach for the wider Sea Grant network of 34 Sea Grant programs and their stakeholders. If you're interested in our work and what else we do and have going on, I encourage you to visit our website and also follow us on social media, we have both Facebook and Twitter.

But now I want to get to what everyone was here for today, which is a presentation on Understanding and Responding to Massive Sargassum Influxes, presented by Mariana León-Pérez, but first we have an introduction by Ruperto Chaparro, as I mentioned from the Sea Grant Puerto Rico.

Ruperto Chaparro:

Hello, good afternoon to all of you. I am the Puerto Rico Sea Grant director, I'm Ruperto Chaparro and I would like to put into context the situation in Puerto Rico because you need to understand what we're going on in order to understand the projects that we- and the efforts- we have been developing for the last 40 years here in Puerto Rico Sea Grant. I have been with Sea Grant for 35 years and I have been the director for the last 15 years. So I have some photographs that will talk a little bit about the projects I will be explaining. I'm going to go very fast and then we can have some time for questions or you can write me an email, or whatever is of your interest.

So, I think the situation in Puerto Rico is really different from many states; Puerto Rico is bankrupt. It has been hit by a big hurricane, that was in 2017, hurricanes Irma, Maria, which were two extreme events, hit Puerto Rico really hard. This is a condo in Rincon where, since the hurricane, people started complaining about the way the condo was constructed on the maritime zone. Puerto Rico Sea Grant has been a leader trying to explain the dangers of developing in the maritime zone. And even though we have been going to public hearings and educating people, the government, sometimes by mistake and other times through corruption, have permitted the development of the maritime zone. And this is an example of what happen when you develop in the maritime zone.

Let's go to the next slide. People started complaining about this and because there is a law that if your infrastructure is destroyed, the ocean has established a new maritime zone. So the owners of the condo decided that they were going to do the swimming pool again in the same place and develop other amenities and infrastructure in that area. So people started sleeping and they made a camp- developed a camp in front of that building. And the cousin of the governor, who had an apartment in that condo, was influential in bringing the police and there were some confrontation with the police, however people succeeded.

The next slide please. And they develop a campaign that the beaches belong to the country, "las playas son del pueblo". And this was a very interested case because it went to court and in all three courts in Puerto Rico the people won. However, the owners of the condo have not been or- haven't agreed to destroy it, but they were ordered to destroy it, so still the camp is at that beach. So Sea Grant was an advisor for some of them. The next one, yeah. This is another area where Sea Grant has been very instrumental in it, we have 30 drowning incidents in our beaches every year. So in the last 30 years we have 900 drowning incidents in Puerto Rico, which is unacceptable. Part of the work that Sea Grant have been doing is educating about the development of lifeguard corps for our beaches, but the government doesn't want to spend any money on that. So part of the effort that we have been doing with some of our researchers is to develop rip current maps and we put them at the beaches, so that people know how to save or get out of the rip current if you're catch. And these are different for every beach that we have developed these maps.

The next one please. We have a publication that is called Marejada, and in that publication we deal with different topics. For example, on the first one, those are diving fishermen, scuba diving fishermen, and we have been called by the Hyperbaric Chamber in San Juan, we only have one Hyperbaric chamber, to treat driving accidents, and they told us that something had to be done with the fishermen in Puerto Rico because every time they are getting more and more to the hyperbaric chamber and worse condition every time. So we started developing a survey about what is going on with the fishermen, we learned that they are sucking sometimes seven to eight tanks a day. They don't know how deep they go because they go without any equipment, only the tank. So we decided to train the fishermen and certify them through PADI. And we already certified 15 in Cabo Rojo, which is one of the first areas where they have incidents and at this moment we are conducting another one in Vieques for 17 fishermen.

And we expect to liberate some time at the hyperbaric chamber and the fishermen we are giving them some of the equipment, the time pressure and... they don't have anything, so we are giving them some equipment to help them be more safe. Also on the middle one, we have been working with the marine research in Puerto Rico. We have been instrumental in all marine research established in Puerto Rico, and we are co-managing Tres Palmas Marine Reserve, which besides of being one of the areas that has acropora palmata, in best condition in Puerto Rico. It also has the biggest surf break in the Caribbean. It breaks 40 feet waves that are very attractive for surfers from all the East Coast and some of the Hawaiian and West Coast surfers also visit us for that.

On the third one we have the Marejada, those are the Cabo Rojo South Flats. That is a 500-year-old business and it was also destroyed partially by Hurricane Maria and we developed an effort to try to remediate the situation with the help of Fish and Wildlife Service and the Department of Natural and Environmental Resources. We're doing some green infrastructure development, developing some sand dunes and other efforts that Fish and Wildlife got \$1,000,000 to work on that.

Next one please. These are a big effort that we have been developing in our education component and Sea Grant is the only organization in Puerto Rico with a mandate to educate resource users about coastal and marine resource conservation and wise use. We have developed these curriculums where we have a pre-test, a post-test, we have the plans for the teachers, we have activities, there is a book for

the students to practice reading. We have for little kids also an activity book and a story. And besides the success of these curriculums, we have 1200 teachers that have been trained already. We train the teachers that are going to use that, the curriculums. We have about 600 schools that are already using these curriculums.

And the next one- these are two of the curriculums, we have them on marine grasses, mangrove areas. Next one- we have coral reefs and climate change. These curriculums are being now translated. Yeah, keep the next one. These are the activity books and the storybook, those have been applied from kindergarten to seniors in high school and we are now translating them into English so that they can be used at the US Virgin Islands. They're being used at the Dominican Republic, at Venezuela and Cuba is asking for them also. This has been a very successful effort from our education component.

And- the next one please. We also have a laboratory manual, two of them, that are also being used by the teachers and by the schools. The next one, and we develop one for CARICOOS, who is part of the IOOS NOAA organization, which is a main one for the waves. And we're developing another one for estuaries and we are working... Next one, we're working on another one on marine debris. Yeah, the next one please, for NOAA, which will be completed probably in six months.

Next one. In our communications department, we have developed a series of books that are very popular with resource users, teachers, and resource managers. We have the Sea Birds of Puerto Rico book, we have the Fishes of Puerto Rico book, we have posters also of the materials. All this material is developed in our offices. We have three illustrators, scientific illustrators that do all the art in our publications and our posters. Next one. This is a fresh water book native of Puerto Rico, this is the only book that has been developed on fresh water fishes in Puerto Rico. Next one, please. We also are working now with a chart book and we have completed a marine mammals book also.

Next one. This is part of our campaign to deal with the lionfish, which is an invasive species that has been causing some trouble in our waters. And the way we dealt with that was to develop a campaign to tell people to eat lionfish. And we produce this publication which has about, I don't know if it's 15 or 20 recipes, on how to do the lionfish. And I tell you that it's very popular among fish consumers and it has been a complete success dealing with the lionfish in Puerto Rico.

Next one, please. This is a tool that we have developed, this is a surfing guide. You go to our page and it has a map and depending on the area you are, you touch one of the waves on the map and it will give you a pin on how to get to that surf spot. And also it has information about the brake, if it breaks to the left, to the right, how is the bottom, if it's rock, corals or sand and the degree of difficulty also. It has been recently generated and we already have a lot of people looking for that. Next one, please. This is part of the surfing tool and you can see the white spots there are the waves, wherever you touch there it can take you and give you directions on how to get there.

Next one, we're big collaborators with CARICOOS and due to the drowning incidents that we have, we work with CARICOOS. They submitted a research proposal to our RFP and it was to develop a wave program that could be used by the weather service to advise about the height of the waves and the difficulties and dangers of different beaches due to the waves because waves have to be related to rip currents. So after we completed that research project, the app Pa' La Playa was developed by CARICOOS and it is an app that tells you, it has more than 100 beaches on it and you can get information there of water quality, wave height, realtime temperature, rain. So it has been a very good app which was developed after a Sea Grant research project. And next to that is the CARICOOS Boating App, which was developed as a result of Pa' La Playa.

Next one, please. I think this is all I have. If you have any questions, you can write me or you can ask whenever if we have some time.

Lourdes Carreras-Ortiz:

Perfect. Thank you so much. And now we'll be hearing from Mariana León-Pérez, that she'll be presenting specifically on her presentation of sargassum and it's ecological effects. So I hope everyone enjoys and there'll be a Q and A at the end.

Mariana C. León-Pérez Ph.D.:

Hi, so thank you so much for inviting me to give this webinar. I just completed a doctoral degree in coastal marine system science from the Harte Research Institute at the Texas A&M University in Corpus Christi. And today I'm going to talk about the main findings of my dissertation. This is an interdisciplinary research where I use different disciplines including remote sensing, social sciences, law and policy to address the sargassum issue. Let me move this so I see here, okay.

So let's start with the problem. Since 2011, massive influxes of sargassum have been arriving to the Caribbean region and although many see sargassum as a monster, really with appropriate mediation actions its negative impacts can be reduced and also new opportunities can arise. So it's very important to understand better this situation. I'm going to start by just saying that sargassum is a brown microalgae that lives its entire life floating in the ocean column and it's a very important ecosystem in open water. And it was designated as an essential fish habitat in 2019 for the area of Puerto Rico and the U.S. Caribbean.

Historically, sargassum is found in the Sargasso Sea, north of Puerto Rico, but however, since 2011, due a climatic anomaly that occurred just before that it established a new production system in the North Equatorial Recirculation Region right here. And, every year, sargassum then is carried by currents and winds towards the Caribbean area. So when sargassum starts to accumulate in the shore linings, it starts to decompose and eventually it creates sargassum brown tide. And sargassum brown tide is brown water with reduced oxygen, pH and high nutrients and it can cause different things including seagrass, coral and fauna die off. Also, when sargassum starts to decompose, it creates hydrogen sulfide and ammonia gases which are toxic to the human respiratory system. And sargassum also when touched can cause allergic reactions to some people and all of these impacts the tourism industry, the fisheries and other livelihood.

So as you can see, this is a very complex situation that requires a holistic approach and that's why I decided to use a social-ecological system approach where both the ecological system and the social system are considered and integrated with feedbacks between them.

So the overall objective of the dissertation was to provide information for the management and decision making processes regarding sargassum accumulations on the coast of Puerto Rico. And I divided it into three research chapters. I'm going to talk here a little bit about the first one, which is to develop a method to the dead sargassum accumulations on the shoreline using remote sensing. So I'm going to spend some minutes on that. Then I'm going to briefly talk about the second chapter, which aims to understand the social vulnerability of a coastal community in Puerto Rico. And at the end, the one that I'm going to be focused on more is the chapter about the legal aspects of sargassum removal and ocean disposal in Puerto Rico.

So, let's start with the first one. So far, most of the detection efforts that have occurred of sargassum, has been conducted in offshore waters. And here you see two examples, the one on top is the optical oceanography laboratory approach from USF, and the one below is the NOAA AML approach, and they use different sensors. Also, because of that they have different spatial resolutions and they applied different algorithms. But what they have in common is that both of these approach, they mask out areas

that are near the coast, the shoreline, and that's where most of the impacts are occurring and therefore we identified that there was a data gap there.

So the objective of this research was to develop a method for using multi-spectral satellite data to identify sargassum influxes on the coast and assess the temporal and spatial dynamics of these occurrences. The study area is in Puerto Rico- particularly in La Parguera Nature reserve. This is a very important nature reserve with different ecosystems including coral reefs, mangroves, sea grasses, bioluminescent bay, and it's very important for local tourism.

So I'm just going to briefly talk about the methods I use Google Earth Engine, this is an online platform that allows to process big amount of data in the cloud. And I use the Sentinel-2 MSI sensor data that is available there from September 2015, to January 2022. And I apply a multi-index approach that incorporated a combination of different spectral bands and also 16 vegetation, seaweed and water quality indexes. And I apply a Random Forest supervised classification then I use training and validation data as well. And at the end I analyze the temporal and spatial dynamics. So I'm just going to show you what we were able to do.

This is... We were not only able to detect fresh sargassum as previous efforts have done, but we were able also to detect decomposing sargassum and sargassum brown tide. All of the classes were equally well detected with an overall accuracy of 97%. So I'm going to show you now some of the results so you can see how it looks like, this is little bit of fresh sargassum accumulated over there, a little bit of- more decomposing sargassum, and then sargassum brown tide in brown.

I calculated the mode for each pixel for the whole time series and identified where hotspots of sargassum accumulation occurred. And we define these as areas where fresh sargassum and sargassum brown tide persisted throughout the whole time series. And we identified three of them for La Parguera Puerto Rico, and I'm going to show you now the time series for them. This is a monthly average area and our X-axis, you see the years and in the Y-axis you see the area covered, and what I want you to focus on is the seasonal pattern. So you see there's a pattern of going up and down, up and down, and that is something that we expected since sargassum is seasonal. And also you can see that there is a peak of fresh sargassum in 2018 for the three of them, and that's a year that had a lot of sargassum coming and that coincides with other observations in the Caribbean.

Now let's focus on the one, the hotspot on top, Isla Cueva, here you see fresh sargassum. As you can see, it follows the same, the pattern, the seasonal pattern. Then decomposing sargassum in blue, you see that it's more common during summer months where sargassum is present the most. And then sargassum brown tide, this is the most interesting part I think, let's focus on 2018 and 2019. And here you can see that sargassum brown tide follows more or less the same pattern. However, there's a phase shift towards the right and you see the sargassum brown tide really makes a peak few months after fresh and decomposing sargassum maximums. So this is telling us that the influence of sargassum is not only occurring during summer months, but basically throughout the whole year. And this has very important implications for the social-ecological vulnerability of this community.

Stephanie Showalter Otts:

Hi Mariana, there's a quick clarifying question in the chat about the difference between fresh sargassum and sargassum brown tide, is one referring to when it's in the water?

Mariana C. León-Pérez Ph.D.:

Both of them are in the water, fresh sargassum, it means live floating healthy sargassum, the one that we usually see when it arrives. Decomposing sargassum in this case for this study, it starts to look

whitish because it's still wet. It's not on the beach, it's near, accumulated along the mangroves. And then sargassum brown tide is all of the decomposition, all that dissolved organic matter that turns the water brown. So that's the difference between them.

Okay, so let's continue. And then I'm going to show you La Parguera, this is the hotspot that is located more towards the west. And here you see that there is less fresh sargassum but I want to focus is that there's more sargassum brown tide in relation to fresh sargassum here, and this is due to the geomorphological characteristics and main current and wind direction. So this area, depending on those characteristics, then it will determine where really these accumulation hotspots will occur. And in this case it has more sargassum brown tide because of the current that is driving sargassum brown tide from the other hotspot that is located up current, so the Isla Cueva, Isla Guayacán, sorry. So this what is telling us is that sargassum brown tide can travel away from where it was generated, so it's another important factor to consider.

So the main takeaways of this research were that temporal and spatial dynamics of sargassum hotspots showed year-round impacts to the coastal system. So it's not only during the months where we see fresh sargassum and sargassum coming in, but it stays for the rest of the year. Also, geomorphological characteristics of the shoreline and also prevailing current and winds drives the accumulation hotspot where they will occur. If you want more information on this research, you can find the publication that we have in the Marine Pollution Bulletin.

Okay, now let's move to chapter two, which aim to understand and map the social vulnerability of a coastal community in Puerto Rico. I'm just going to show you very quickly what we did and the main results. So we assessed the social vulnerability in terms of the exposure to the stressor in this case, to the sargassum influx, the sensitivity of the social system to this stressor and the adaptive capacity that the system has to adapt, and that will give the social vulnerability index. So this is just to show you an example of the results. This is for coastal community in Puerto Rico called Palmas Del Mar, it's located in the East Side of Puerto Rico, and the data was grouped into residential communities. So it's telling us what is the social vulnerability of households within Palmas Del Mar and it can tell us what are the factors that can help us improve the adaptive capacity and reduce the sensitivity so they can deal better with the situation. If you have any more questions about this, please let me know.

So let's move now to the chapter that is focused on the legal aspects of sargassum removal and ocean disposal. I'm going to start by saying that there are different mediation strategies that have been implemented. The first one and more common is to not to take action. Then also there are some areas where manual removal have occurred in the beach and also mechanical removal, installation of boom barriers to prevent sargassum from accumulating near the shoreline, manual removal using boats and also mechanized removal using boats. One thing that have happened is that most of actions have been occurring without the authorizations required by the government. So this is why it's important to know to clarify this aspect. So I'm just going to give you a little bit of background about Puerto Rico Law and policy. Puerto Rico is an unincorporated territory of the United States and the management of sargassum, it's a joint responsibility between the Commonwealth and U.S. federal governments.

In Puerto Rico, the local agency that is in charge of the conservation and management of natural resources is the Department of Natural and Environmental Resources, the DNER. And they created in 2015 a protocol for dealing with sargassum accumulations, but, however, this protocol does not specify the permits that are needed. The territorial waters of Puerto Rico are up to nine nautical miles and then the exclusive economic zone, which is a federal jurisdiction, it's here (powerpoint slide reference). So the objectives of this research was to describe the legal framework in Puerto Rico by clarifying the jurisdiction of federal and local agencies, for sargassum removal and sargassum ocean disposal. Also, to clarify the permits needed for these activities, identify obstacles between government processes and

relevant groups needs and to identify potential solutions to facilitate the permit application process. All of this was conducted using a knowledge co-production approach where we incorporated agencies and other relevant groups to be part of the research process.

So the method, I started with a literature review, which is to identify potential federal and commonwealth laws and regulations that could apply. Then I started doing semi-structured interviews with agencies and other relevant groups including coastal community members, private companies, and other entities that are conducting mitigation actions. And they were also invited to a workshop that we conducted last year, and I'm going to give you a little bit of more details about that workshop. It was a virtual workshop that was conducted in collaboration with Sea Grant Puerto Rico, it was divided into three parts. The first part consisted of an introduction to learn about the situation of sargassum in Puerto Rico, and also agencies had a moment to tell us the laws and regulations that they think apply, and also other relevant groups presented to show us what are their situations at their respective sites. And then the next part was an activity where co-developed a permitting process flow chart to identify the permits that are needed for the different actions. And the last part was a brainstorm exercise to identify ideas for overcoming obstacles and facilitating the permitting process. Participation in the semi-structure interviews and workshops is here. We had the Army Corps of Engineers, we had different offices within NOAA that also participated, we had the Caribbean Fishery Management Council, US Fish and Wildlife Service, the EPA and also the Department of Natural and Environmental Resources.

These are the laws and regulations that were identified both for the local jurisdiction and the federal jurisdiction that apply to this. And now I'm going to show you the flow chart that we co-developed. It consists of a series of questions that guide the proponents of the sargassum mitigation activity to the permits that they need to request.

The first question is, where will the activity take place? If the activity takes place seaward of the main high water line, then the next question will be, if the activity will require mechanical means to collect sargassum or require the placement of a structure. If the answer is yes, then they will need to request a joint permit. And this is an application that allows other federal and commonwealth agencies to evaluate the permit request at the same time and provide recommendations regarding consultation, certification or permits that are needed. If the answer to that question is no, or if the activity is conducted in the dry part of the beach, then the other question will be if the activity's for profit. Either way, the applicant will need to request DNER authorization under regulation 4860, but if it's not for profit, then they can request a waiver for the filling and occupation fee. And then the last question here will be, are you a nongovernmental entity and could your action cause a take of a endangered species act listed species? If the answer is yes, then it's recommended to request a technical assistant under Section 10 with the respective agencies.

So another important factor to highlight is that in the case of federal actions such as activities that involve federal funds or federal agency or federal permit, applicants will require consultations under the National Environmental Policy Act and other federal laws. And finally, for the Sargassum motion disposal flow chart, the question will be if the activity involves ocean dumping, and if that is the case, the applicant will need to request an EPA permit. And also if the activities within territorial waters then an authorization on the regulation 4860. It's important to mention that this does not include the transportation and ocean dumping of dredge material. So if the activity will pick sediments that are below the sargassum that is sitting in the ocean floor, or there's sediments that is going to be removed, then that will be- may be considered dredging. And in that case, then it will require a core permit from the Clean Water Act and also the Marine Protection Research and Sanctuaries Act.

Another policy mechanism for managing sargassum is the Stanford Act. For the first time in history, last year, the US Virgin Islands declared a state of emergency due to a sargassum influx that affected their

water supply. For this federal assistance to be provided, the following criteria must occur: An emergency or major disaster needs to occur, the needs exceed local government capabilities and resources, and also the local government has exhausted its emergency plan. So it's important to have an emergency plan in place.

Now I'm going to mention some of the obstacles between agency processes and relevant groups need that were identified. The first one is a lack of knowledge of the required permits. For example, there were no guidelines on the type of permits needed to request. There's a lack of interest and trust in government processes. Another obstacle was there were a lot of discrepancies between agency understanding of the permits and the processes that apply. For example, there are some agencies that have limited institutional memory, there're misunderstanding of when, for example, a joint permit application is needed. And what I heard from most of the agencies that really every project should be evaluated on a case by case basis. And the last one is that there's a time lag between the urgency of relevant groups need and developmental government policies. An example of this is that the slow government response, for example, basically a decade after the first sargassum influx event in the Caribbean, this workshop took place. So it takes a while for policy to change and things to happen. We understand that there are certain situations that require immediate action, however agencies said that the expedited permit applications are not likely to occur in the short term. So it's recommended that affected entities request, plan, and apply for permits beforehand.

So talking about recommendations, and I'm going to show you just the four main recommendations provided by participants. The first one was to create a territory wide plan to respond to sargassum. I had to say that at the beginning of this year, the governor of Puerto Rico approved the joint resolution to order the DNER to prepare a mitigation plan to handle sargassum influxes. And the deadline passed, but they're still working on it. And so it's important that we'll have that soon hopefully. The next one is to develop plans and permit application packages for priority areas where we know that sargassum is recurrent. Also, continuing conducting these workshops and round tables with agencies to clarify other aspects- legal aspects. For example, legal aspects regarding land disposal and sargassum processing. And the last one is to create a website where all this information can be shared.

So the next steps will be to assess the legal aspects of sargassum disposal on land and also sargassum processing. We are working in collaboration with agencies and other relevant groups in a publication, in a manuscript for a peer review publication and so we want to share all this information through that. And also, very importantly, we are working with Sea Grant Puerto Rico to do a short and summarized publication to be disseminated through the public and coastal community so they can respond better to these events.

So with that, I am going to finish. I would like to thank all the entities that contributed, the CCME scholarship that I had, the Harte Research Institute, Sea Grant Puerto Rico that have been crucial in this process. And thank you so much for inviting me. If you have any questions, you can write me an email. But before I finish, I have to say that I will be attending a scientific conference next week, so I'm going to be out of the office and then I'm going to take some days off. So if you write me, just expect that I'm going to be- I will wait a little bit more, you have to wait a little bit more for me to respond. So thank you very much. Yeah, if you have any questions, please let me know.

Lourdes Carreras-Ortiz:

Thank you, Mariana. That was fantastic and very informative. So now we'll be moving to the Q and A portion. And there are actually a couple of questions that came about on the chat already. Let's see. I think you might be able to see them, but one of the first ones that I was able to note... Oh, does the presentation take up bandwidth? I don't know if you have to continue sharing the screen. Let's open the

chat again. So one of the first questions is that you mentioned the ocean disposal of sargassum, during last year's emergency response to Sargassum in St. Croix, EPA advised no ocean disposal could be authorized. Do you have different information?

Mariana C. León-Pérez Ph.D.:

Well, exactly about the situation in- there, I don't know. However, I talked with people there in EPA of the Ocean Disposal Program and they told me that there's so many uncertainties, so many questions regarding how sargassum will behave when you dispose it, what are the potential impacts to the benthic ecosystem... There's so many questions yet that they will not be able to provide, I believe a general permit, if I'm correct. However, what they see is that it could be a research permit, so that they can provide that permit and also the permit will help also answer some of these questions, so in the future then they know better what are the potential impacts of this.

Lourdes Carreras-Ortiz:

Okay, perfect. Thank you. And then there's another question from Tiffany who's asking, are there studies noting the absence, maybe the presence, of heavy metals in sargassum? And someone commented, specifically maybe arsenic and other heavy metals?

Mariana C. León-Pérez Ph.D.:

Yes, there are studies about that. Right now in the top of my mind, I don't have the name, but yes, they are. And there's a fairly recent one that talk about that, so it's something that it needs to be considered in terms of the use. If sargassum is going to be used for either animal consumption, human consumption, or for anything that contaminates the soils, then that is something that needs to be considered. Yeah.

Lourdes Carreras-Ortiz:

Okay, perfect. And there are some comments relating to the worry about sargassum removal and maybe removing the sand from the coast. But let's see if there's any other... There's another question here that says, is that territory wide plan likely to emerge? The one you mentioned in your presentation.

Mariana C. León-Pérez Ph.D.:

Yes. I know that they're working on it and I believe it's going to be published soon. However, these processes, as you may know, with the limitation in personnel in the government, it sometimes takes a while. I haven't seen a draft of it, so I don't know the extent of it. But yes, that's something that we're looking forward to see.

Lourdes Carreras-Ortiz:

Okay, perfect. Another question, are there latitudinal limits of significant sargassum inundations, for instance, doesn't present problems north of North Carolina? or other?

Mariana C. León-Pérez Ph.D.:

If it's a problem to higher latitudes, is that the question?

Lourdes Carreras-Ortiz:

Bradford Benggio, you presented the question, so I don't know if you want to get off mute and maybe explain your question before we continue.

Bradford Benggio:

Mariana, this is Brad. Yeah, so what I'm interested in is, are there northern latitudinal limits to where we're experiencing significant sargassum inundations? So for instance, is it a problem only south of some latitude limit and then it decreases such that we don't have significant problems?

Mariana C. León-Pérez Ph.D.:

Yeah. Okay, I see. That I know of, a specific latitude, I haven't heard of that. I know that Florida is dealing with massive amounts of sargassum as well, maybe not as much as other places in the Caribbean. And I know that they have observed some sort of accumulation of sargassum northward of that. However, I haven't heard about being a big issue in states that are norther than Florida. I don't know if somebody here has more information on that, but that's what I have heard so far.

Lourdes Carreras-Ortiz:

Thank you. And so let's continue on with another question since we're running out of time. Could you please say something more about the joint permit process? I don't know if you can, kind of, summarize a little bit since...

Mariana C. León-Pérez Ph.D.:

Yes. The joint permit application it's a way that the government decided to, particularly the US Army Corps of Engineer, to facilitate the permit applications because sometimes you have many different agencies that have jurisdictions. So you don't want the applicant to provide the same information for all of them and then having a back and forward with all the agencies separately. So this is a way that it's a package, an application package that you submit to the Corps of Engineer, and then everybody, all of the agencies, local and federal will see it at the same time, and that way they can facilitate that process. So that's basically what it is.

Lourdes Carreras-Ortiz:

Okay. And let's see. Maybe one more question and then if there's any other follow up questions, you guys can email Lauren Fremin or email Mariana directly. But let's see, this one could be for Mariana or Chapa. They were asking if, do you know if PR will be working on a sargassum management plan like the US Virgin Islands? So I don't know if either of you would want to take this over, if you're working on a joint program.

Mariana C. León-Pérez Ph.D.:

Yeah, they are working on a plan right now. I don't know, I'm curious too if they are in communications, because I saw that the US Virgin Island is also working on that. But yeah, they're working. Yeah, I think it's the same what we were saying before about that plan that they're drafting, but it's not still published. Yeah.

Lourdes Carreras-Ortiz:

Okay, perfect. Yes. So Stephanie is... The recording and all sides will be shared. You'll get an email after the meeting, but then also the National Sea Grant Law Center's website will have the actual recorded

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zoom with the transcripts and captioning as well. Let's see, we have about six minutes left. Someone mentioned ocean dumping and more details on the permits, but I guess we covered that, unless there's something else you'd like to say. And there was another comment about Dominican Republic hosting the Sargassum Regional Conference in Santo Domingo on June 15th, which I assume you already knew, but since that would be the last question... Oh, I guess there's a question, from Mariel asking if there is a formal research network between Caribbean Islands or is that the one? Since there's a conference in the Dominican Republic, if there's just a joint program? For Chapa or Maria, if you guys know this?

Mariana C. León-Pérez Ph.D.:

Yes, there's the sargnet listserv (<https://listserv.fiu.edu/cgi-bin/wa?A0=SARGNET>) that is a great place to be, where all researchers and also affected entities are there. So they share basically anything that is happening. So I believe I can quickly search for the link and see-

Lourdes Carreras-Ortiz:

Oh yes, and post it on-

Mariana C. León-Pérez Ph.D.:

-I can put it there in the chat. (<https://listserv.fiu.edu/cgi-bin/wa?A0=SARGNET>).

Lourdes Carreras-Ortiz:

And see. Okay. And yes, that would be it. And so I guess Janice just had the question on ocean dumping and provide more additional details on the permits required. And I don't know Janice if the answer was provided. Okay, so does anybody have any final questions, that, before we kind of say goodbyes and thank our speakers, if anyone needs to raise their hand. Otherwise, like I mentioned, everything will be provided. You will get an email with access to the recording and the actual Zoom, which will be on the National Sea Grant and Law Center's website. And we invite everyone, I'll just do a little quick ending here. So out of respect for everyone's time, I want to thank everyone so much for joining us for our webinar and hope... Oh, wait before... Evelyn Huertas, I know you raised your hand, you can have I guess a quick little question if you do so, and then we'll wrap it up.

Evelyn Huertas:

Yes, I came a little bit late to the workshop, but it seems very super. I have a lot of noise here, but that's been considered the use of sargassum for the landfill capping?

Mariana C. León-Pérez Ph.D.:

Landfill capping, that is for, like, construction?

Evelyn Huertas:

No, for the landfill. You see when-

Mariana C. León-Pérez Ph.D.:

Ah, for the landfill.

Evelyn Huertas:

For the landfill.

Mariana C. León-Pérez Ph.D.:

I think, well, I know that, I don't know if Chapa knows more about this, but there are some landfills that, have you, have accepted that, but that's not common because we have a issue in Puerto Rico, very large, big issue with limited capacity in landfills. And sargassum, there's things to consider regarding the composition, the chemicals that can be inside, for example, heavy metals that are present in sargassum. So I think there's some things that need to be considered, I haven't heard about formal consideration of using it as a filling, but I know that municipalities that have asked for allowing to dispose sargassum in landfills, they basically, usually they don't get it. Yeah.

Lourdes Carreras-Ortiz:

Perfect. Okay, so we invite everyone, thank you again for joining us. And just as a quick note, we are on social media as our slide shows, you can follow us there to get any new updates about this webinar and upcoming webinars. And we actually invite everyone to join us for our next webinar on June 21st, which is about phosphorus, lead services lines, offshore wind and drought projects of the 2022 2023 Sea Grant policy fellows. The registration link should have been shared in the chat just now or a little bit ago. And the best way, again, like I said, to stay tuned for future announcement of the Law Center is via social media. So thank you very much everyone, again, for joining us today. And thank you Mariana, and thank you Chapa for all of your time and presentation and information.

Mariana C. León-Pérez Ph.D.:

Thank you so much. Take care.

Stephanie Showalter Otts:

Thank you everyone for joining.

Ruperto Chaparro:

Muchas gracias.

Lourdes Carreras-Ortiz:

Thank you.