



Briefing Transcript

Assessing National Park Asset Flood Risk: Retreat, Adapt, Fortify?

<https://www.eesi.org/briefings/view/041420data>

April 2020

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Daniel Bresette

Good afternoon everyone, happy Tuesday. Thanks for joining us today for the second installment of our Climate Adaptation Data Week online briefing miniseries. I'm Dan Bresette, the executive director of the Environmental and Energy Study Institute. This miniseries is part of our overall effort to educate policymakers and the general public about climate change solutions and resilience strategies in coastal communities across the U.S. Yesterday we heard from two experts about data needs in the state of Washington. If you were unable to join us yesterday or if you have missed any of our previous briefings to date, be sure to visit us at www.eesi.org for video recordings and written summaries, and be on the watch for briefings on two more areas: Alaska next Tuesday, April 21st, and on a date TBD on Puerto Rico and the U.S. Virgin Islands. When you visit our website I encourage you to sign up for our bi-weekly Climate Change Solutions newsletter. [inaudible] informed all of you about all of EESI generally and specifically about all of our briefings. Later today, in fact, we'll drop the latest issue of Climate Change Solutions. I took a little time this week to write about what we might learn about climate change policy from our response to the coronavirus outbreak. I hope you'll take a moment to read it and reflect on your own experience over the past month or so.

As I described yesterday, this briefing miniseries format is new to EESI. It's part of our effort to keep focused on the urgency of climate change. Our goal for this weeklong regularly scheduled briefing miniseries is to explore a topic in greater detail and to do so in a more conversational style. You can find the complete schedule of this briefing miniseries online at EESI.org. Please take a moment to fill out our survey to tell us what you think about this alternative format. Be sure, we'll still be holding online briefings with larger panels and longer time allotments for presentations going forward, but here we are on the second day to hear from an expert about the topic *Assessing National Park Assets Flood Risk: Retreat, Adapt, Fortify?*

After the presentation, my colleague Amber Todoroff and I will co-moderate a discussion and you can participate too by following us on twitter @EESIonline and sending us your questions. You can also send your questions to EESI@eesi.org. Our expert today is Rob Young. Rob is a director of the Program for the Study of

Developed Shorelines, a joint Duke University/Western Carolina University venture. He is also a professor of geology at Western Carolina University and a licensed professional geologist in three states. The Program for the Study of Developed Shorelines is a research and policy outreach center serving the global coastal community with a mission of conducting scientific research into coastal processes and to translate that science into management and policy recommendations through a variety of professional and public outreach mechanisms. I'm very happy to also say Rob is a member of EESI's advisory board. With that, Rob, I'll turn it over to you. I'm really looking forward your presentation today, thanks for joining us from North Carolina.

Rob Young

Hello everybody from my office here at Western Carolina University, Cullowhee, North Carolina in the beautiful southern Appalachian Mountains where we're having a glorious spring so far. I wish that we were doing this in person because I promise you I'm a lot funnier and better-looking in person. I'm going to try and use a laugh track today, so I hope that won't be too distracting, because I miss having an audience, but we'll see how it goes.

I'm going to be talking about the work that we've been doing for seven or eight years now with our partners at the National Park Service to conduct vulnerability assessments to guide good adaptation and resilience projects and policy. First, a shout out to our long-term partners within the National Park Service, including the Sustainable Operations Branch, Facilities Planning Branch, the Climate Change Response Program, and of course many many people in the National Park Service regions and at individual parks. These are people who I have such a tremendous amount of respect for, doing difficult jobs in difficult times, and so thank you for everything that you do. Thank you for trusting us with this project, and I look forward to continuing to work with all of you.

To give you some perspective, what we're attempting to do here is we are trying to understand how to guide national policy for coastal parks that are going to be exposed to rising sea level and coastal storms over the next few decades. This simple table here is a first cut analysis that we did a few years ago looking at total assets in the parks exposed to one meter of sea level rise, no dates attached. What you can see is that there is a significant value of high-exposure assets, somewhere along the lines of \$23 billion. It's concentrated in the Southeast region and the Northeast region of the National Park Service, which really shouldn't be a surprise to too many folks. The Southeast region with its barrier island parks is very low-lying and geomorphologically sensitive to all of the hazards that we'll be talking about.

Before I proceed with the description of what we've been doing for NPS, let me take the opportunity to tell you a little bit about the Program for the Study of Developed Shorelines. We are a joint effort between Western Carolina University and Duke University. We moved to the campuses of Western Carolina about 12 years ago. We try to take innovative approaches to studying and understanding coastal processes, but most importantly what we try to do is take coastal science and turn it into really good management and policy, and help other folks do the same.

We have a number of interesting products that we provide. We maintain a beach nourishment database; we track every single beach nourishment project in the United States of America. Beach nourishment is when you add sand to the beach to provide coastal protection, and our beach nourishment database is widely utilized by media and academic entities to understand both the impacts and costs and to generate management and policy discussions. We have the Storm Service Database that includes every storm surge measurement that's been recorded in the United States of America. The database is searchable and allows people to come to one spot to have some sort of understanding for their storm surge vulnerability based on historical data. We track global sand mining and have been working with the United Nations to develop a position paper on the impact of sand mining globally, which is becoming an issue that folks are really beginning to understand is one that has significant human rights as well as environmental ramifications. Our primary job is communication. For more than 25 years we have tried to serve as an outfit that does a yeoman's job in using a variety of different formats both formal informal, academic and non-academic, to communicate science to the general public regarding the coasts, coastal restoration, coastal storm impacts, coastal processes, and coastal vulnerability, which is what we're here to talk about today.

This project with the National Park Service started 17 years ago. We were brought in and asked to develop a protocol to help the National Park Service understand the vulnerability of their infrastructure. It became very clear in our initial year, year-and-a-half interacting with park personnel that what was really needed was information about individual assets: individual buildings, individual bridges, individual stretches of roadway, that

in order to really work with this information in a way that facilities managers need to that we needed to drill down at the building level, at the structure level, the highway level, in order to present the vulnerability information. We've developed a protocol that we believe serves that goal and does a number of other things. We have standardized the methodology and standardized data sources so that the scoring of the vulnerability is comparable from one part to another. If you're making decisions at a regional level you need to be able to directly compare the vulnerability scores of a building in one park to a building in another park.

The information needs to be actionable. Decision-makers don't have the time to pore through a whole bunch of hazard exposure maps and look for their infrastructure, so we turned that on its head and we started with the infrastructure. We started with the asset management database and built the exposure and vulnerability data up from that in order to allow easy access for decision-makers to look one building at a time at the vulnerability data. Finally, the goal that we're still working on is integrating all this information into planning, both short-term and long-term planning.

Many folks are familiar with the sort of traditional view of vulnerability as including exposure, sensitivity, and adaptive capacity of whatever it is that you're trying to understand. For the built environment, adaptive capacity is a little bit different. If you look at natural environments of salt marsh, for example, it sort of has an inherent adaptive capacity. If sea level rises at a reasonable rate, that salt marsh can move landward and upward and it will be okay. It has an adaptive capacity. For the built environment, adaptive capacity is a lot more difficult to understand.

This is the Cape Hatteras Lighthouse being moved a number of years ago. A lot of folks said that it couldn't be done. A lot of folks thought that maybe it was too expensive to do it. But the fact of the matter is that with the built environment you can move just about anything that you want if you have the money and if you have the political will. On the other hand, there are some parts of the built environment where adaptation may not be possible because it needs to be where it is, or because it is important to have it there, it may be politically difficult to move. So, adaptive capacity for us comes out of quantifying vulnerability, which leaves us with vulnerability being a sum of exposure plus the sensitivity of the individual structure to the hazard, and adaptive capacity then becomes what you talk about after you have scored the vulnerability. I think you'll appreciate this as I go through. I'm not going to talk in detail about the protocol, but I will go through here and show you exactly what it is that we are trying to quantify.

The first part of the vulnerability assessment is understanding the exposure of a particular asset – building, road, or bridge - to different hazards. We start with a number of coastal hazards like flooding potential, extreme flooding events such as a storm surge, tsunami, sea level rise inundation, shoreline change, and reported coastal hazards. Each of these hazards are mapped individually, and the individual assets are located within the maps for each of the individual hazards. We look at flooding potential data using FEMA data. We look at slosh model runs from NOAA to look at storm surge information. The individual dots here are the National Park Service assets, buildings, structures. We have some internally generated within the National Park Service sea level rise inundation data. We generate our own coastal erosion buffers based on United States Geological Survey data, and other data sources were available to locate NPS assets within those coastal erosion zones. Maybe most importantly, and one aspect of coastal hazards that is missing from many vulnerability assessments, we look at historical flooding data and historical geomorphic change data. This can be a little bit of a pain and can be difficult to locate, and we do this both through past field surveys and reports from past storm impacts. We also utilize some survey instruments where we go to folks who've been working within the park for 20 to 25 years and have them help us geolocate areas where there has been flooding, standing water, before in the past. To us as geologists it's very important to understand these past impacts, these historical impacts. They provide a check on the predictive models of where the water is going to be, like slosh modeling, and they're an important component of really understanding the exposure. One of the best indicators of what may happen in the future is definitely what's happened in the past, even though what may happen in the future will probably be a little bit greater.

The exposure scoring, and again I'm not going to go through the scoring in detail, is a combination of the individual hazard indicators that are all combined into a final score, and that final score is reported in a number of different ways. One of the primary things that we've done to try and make this useful for park managers is to incorporate our analysis directly into an asset management database where individual park assets are listed along with our individual scoring breakdown so you can compare coastal erosion, you can compare FEMA flooding, coastal proximity, sea level rise, inundation, slosh model flooding, historical flooding all to individual assets, and

then you can look at the final scores and the exposure ranking. It's all done within a spreadsheet as well as within GIS if you need to display the information in a way that's easier for other folks to understand. We think that it's important to provide this information in a variety of different formats because it's utilized by different entities both within the Park Service and within the general public, so we have these final exposure maps and we have these exposures spreadsheets that include lots of asset information along with our vulnerability scoring.

The second part of a vulnerability assessment after the exposure is the part that gets done very infrequently, and this is the sensitivity analysis. It doesn't just matter if a particular building may be exposed to flooding. What really matters is what happens when the flood waters are there, and this is the sensitivity of the asset: what is the flood damage potential? What is its storm resistance? We try and quantify a number of different things related to the sensitivity of a particular building, road, or bridge to that flooding or to the particular hazards. We're looking at things like the flood damage potential based on elevation, its storm resistance, historical damage, and protective engineering. We gather some of this information through field visits. The sensitivity analysis is typically not something you can pull off of a NOAA website; it's something that you typically have to capture yourself. We use some survey instruments with park facilities folks to capture some of the information, and we use some direct surveying to look at things like the local base flood elevation, the threshold elevation of the building compared to that base flood elevation, and then a final sensitivity analysis from here. Sensitivity is essentially when the flood water gets there, when the storm surge gets there, when sea level rise gets there, what is that the sensitivity of that asset to the hazard and how will it perform? Comparing the threshold elevation of the asset to the local base flood elevation is an example of understanding the sensitivity.

The sensitivity, just like vulnerability, is scored independently and provided in spreadsheets with the exposure data and the other asset data, and then a final vulnerability score is achieved by combining the exposure and the sensitivity. Again, that is provided in large spreadsheets, which facilities managers tend to still like to use because you can sort them in so many ways, and also in an ArcGIS database where you can view the different exposure sensitivity and vulnerability maps in a lot of different ways. At the end of the process, individual reports are written for individual parks with summaries of the statistics of exposure, sensitivity, and final vulnerability. The nice thing about breaking these assessments down by exposure and sensitivity and separating out the separate factors of exposure and sensitivity is that then the adaptation actions for any particular building become a somewhat simple exercise of identifying the possible ways to change the asset's exposure or to change the asset's sensitivity.

Let me say that again: you change the vulnerability of a building or a bridge or a roadway by changing or reducing the exposure or by changing and reducing the sensitivity, and we can simply go back through our exposure and sensitivity scoring and determine a set of possibilities that you can use to lower the exposure or the sensitivity. That can be things like elevate, relocate, protect or engineer, maybe decommission or remove, change the storm-resistant design, or in some cases maybe an engineering downgrade may be a way to best deal with the exposure of that particular asset. We can, in a fairly objective fashion, develop a menu of possible adaptive or resilient actions for each asset based on reducing the exposure or the sensitivity in this way, and then work through that to decide what the final adaptation actions should be.

At the end of the day, every park is provided with a written report, they were provided with a large ArcGIS database that includes all the baseline data that was collected in addition to the final results, and they are provided with large Excel spreadsheets that include information about all of their assets that they already have with our information inserted.

In applying all of this, it's important to remember that the sensitivity analysis is really a critical part about this. It's not just where the water will be but what happens when it gets there. This approach of providing the asset-level detail embedded within the existing asset management database and tools that the folks within the Park Service typically use is intended to make it easy for asset managers to utilize and to provide the information in a way that requires no further analysis, essentially, and is available in a way that folks are familiar with. At the moment, we are working with the Park Service to utilize this information both for short-term planning—five-year planning, annual spending in maintenance for post-storm rebuilding—and for longer-term planning, especially for resources that are culturally, historically important: Portsmouth Village and Cape Lookout National Seashore.

The benefits of this approach is we're providing them with clear, science-based guidance for the allocation of the limited maintenance funding, improvement funding the parks have. You want to make sure that you're spending those funds wisely, so if you have assets that are of very low mission priority but they are extremely

vulnerable, you may want to think twice about spending maintenance funds on those assets. On the other hand, if things that are critically important to the mission of the park and they're vulnerable, then we need to really focus our thoughts and spending on those assets and hopefully devise adaptation and resilience projects to make them more sustainable. These detailed analyses also provide the data to support the funding and the development of proposals for these adaptation and resilience projects through both standard Park Service procedures and through other outside funding mechanisms. I always tell folks that another reason why we care so much about park roads and bridges and buildings is because the best way to protect natural resources in any location, but especially in coastal parks, is to make very wise decisions about your infrastructure.

We have been in the process over the last two years of trying to spin this off in two other locations. We just recently completed a similar coastal hazards infrastructure vulnerability assessment for the village of Duck on the northern Outer Banks of North Carolina. The same process can be very easily and effectively utilized in a municipality where we're doing exactly the same thing: integrating our result with their existing asset management database and providing them with the science-based, asset-by-asset level information that they need to generate adaptation and resilience projects and get the funding that they need to do resilience work.

I want to thank all the folks who do almost all the work on this; I'm just the pretty face talking. That's in particular Blair Tourmey and Katie Peak and Holli Thompson, and I encourage everybody who's interested in listening to follow me on LinkedIn, follow the Program for the Study of Developed Shorelines Facebook page, and please feel free to email me with any questions about any of the work that we're doing at any point. Thanks very much.

Bresette

Thanks, Rob. That was a really great presentation, and I want to follow up with you on the laugh track idea, I think there's some promise there. Your slides are incredibly dense, in a good way, and informative. I just want to make sure to say as a reminder that all of the video recordings from this briefing miniseries as well as EESI briefings in general, in-person and online, as well as written summaries and presentations will all be available online a little bit later, so if you are concerned that you may have missed some of the detail in Rob's slides, never fear, no problem. It may take us a little while to get everything uploaded, but it'll be uploaded and will be uploaded in the highest quality we can manage. Just wanted to make that reminder.

Also, I think one of the reasons I am really excited about this briefing miniseries is the idea that we can tell a narrative about adaptation and data, and so I just want to take a second to recap the title of yesterday's briefing. I mentioned what it was about, but specifically it was titled *Localizing Sea Level Rise Projections for Decision-Makers*. Today's about national parks, tomorrow *Cultural Heritage and Climate Change*, on Thursday *Bridging the Gap Between Science and Decision-Making*, and on Friday 17th of April *Weather and Social Data to Inform Participatory Planning Initiatives*. Hopefully everyone will have an opportunity to join us for all of our briefings this week.

We have a good amount of time for Q&A. Before I introduce my colleague, I just want to remind everyone that you can send us your questions. We have a bunch prepared but we'd love to ask yours, so feel free to follow us on Twitter @EESIOnline and send us your questions that way. If you'd like to email us you can do that too, email address is eesi@EESI.org. We do, in fact, have operators standing by so we'll be able to turn your questions around pretty quickly. Speaking of questions, my colleague Amber Todoroff is going to get us started with that, so let me introduce Amber to everyone online today. Amber's on our policy team, a policy associate, and has worked with Rob on these issues for a while and has been a big part of the team effort that's been bringing us these coastal resilience briefings. With that, Amber, I'll turn it over to you to get us started with Q&A.

Amber Todoroff

Thanks, Dan, and thanks so much, Rob. This is a really cool project. I can only imagine all the time and effort that went into doing this. First question: can you elaborate on some of the specific actions the parks have been taking based on your reports that you've been giving them if they've been taking action so far?

Young

The vulnerability assessments are finding their way into the planning process within the National Park Service in a number of different ways. All of this information has been utilized over the last couple years for a

structured decision-making process at Cape Lookout National Seashore, where the park is taking a very close look at the future of the historical villages like Portsmouth Village, and how to incorporate both the local perspective on the value, historical and cultural and local value of those buildings, with our vulnerability perspective to understand what the best actions are going forward, and that process is still underway.

My favorite examples, though, are really the little ones, so I'll just give you one example. At Biscayne in Florida, this vulnerability assessment was directly used as a part of an institutional planning process to raise the utilities out of the flood zone on several planned buildings to reduce the sensitivity of the structure, thereby reducing the vulnerability, so a relatively small expenditure for a fairly large reduction in the overall vulnerability. It's those kinds of things, the sort of lower hanging fruit, that we really hope doing vulnerability assessments at the asset level and at this level of detail, we hope it's those kinds of decisions that this can really inform.

Todoroff

Great. So, you started working with the National Park Service. Has this attracted attention or interest of other federal agencies, or if not, do you think there's one agency in particular that would really benefit from something like this?

Young

Most vulnerability assessments still do not include the detailed sensitivity analysis, so I would encourage all federal agencies and federal partners out there who are conducting vulnerability assessments of their assets to think about the level of detail that they're getting, and whether ultimately the information that will be arriving on their desktops will be easy for them to access when they're making all kinds of decisions about spending.

And we have engaged with a number of non-federal partners over the last two years, from Horry County, South Carolina and the village of Duck in North Carolina that I mentioned. That work is expanding, so I think that there is a need and an interest on all levels, but I'm not aware of any other federal partners who really adopted what we're doing.

Bresette

Thanks, Rob. Your personality is coming through just fine online; the questions are literally streaming in. I've got a couple here that I'm going to ask you. The first might be a quick one: what's the baseline sea level assumed in the preparation of reports for specific assets and national parks?

Young

We're using a sea level rise analysis that was prepared for the National Park Service and we're projecting out to the year 2050, and I'll be honest I cannot remember exactly which projection we're using at the individual parks. If whoever asked that question would be kind enough to follow up with me afterwards, I can provide a more detailed answer. The protocol is flexible enough that we could be looking at different time horizons, but at the moment what we're doing for these current vulnerability assessments to keep them comparable from park to park is for the sea level rise information we're projecting up to 2050.

It is important to keep in mind that for the vast majority of these coastal parks, 90 percent of the exposure score is coming from the hurricane that could occur this year. It's the exposure to coastal flooding from hurricanes, from the slosh model runs, from coast proximity, to coastal erosion generates a tremendous amount of the exposure in these reports. So while sea level rise is an important component and certainly tells us that none of these other vulnerabilities are ever going to get better, it's just things are going to continue to get a little bit worse. The vast majority of the overall score and exposure is coming from the other natural hazards.

Bresette

Thanks for that, and yes we will definitely take the opportunity to follow up with you and our questioner more specifically about the baselines that went into that.

You were talking about sensitivity and vulnerability and how that's related to decisions in the park about what's critical to the mission, so the next question is, how do you take into account whether an asset is connected to the park's mission? Is that mission connection incorporated into the sensitivity scoring methodology itself, or is

that something that happens later? Is that something that the park manager gets to decide, or whoever is the responsible authority for the park?

Young

The mission importance of a particular asset is not included in the scoring at all. These are purely physical items that we're quantifying, and the mission importance would be part of the adaptation and resilience follow-up discussion. The basic answer is that the exposure scoring, sensitivity scoring, the overall vulnerability scoring is based purely on exposure and the physical characteristics of the structure. It doesn't include whether it's historically important, culturally important, it doesn't include its mission value.

Todoroff

Are these NPS vulnerability assessments publicly available, and if so, where can we find them?

Young

They are currently being prepared for full public distribution. Some of them are available internally within the Park Service. At the moment they are not easily accessible to the general public because they are still being formatted and reviewed by individual parks. We've completed 20 parks and by the end of this year and a half we will have completed all of the parks in the Southeast region, and if you have interest in a particular park please contact me directly and I can let you know whether or not we've done that particular park and the availability of the work so far.

Bresette

Thanks. Another question just came in and again this one may also be worth some offline follow-up as well, but the question is from someone looking to map salinization, saltwater intrusion risk along the coastal plain in the in the southeast part of the country. Is the work that you're doing with the Park Service, do you think that approach would apply to this other effort that is happening with saltwater intrusion? How replicable is what you're doing to other kinds of vulnerability assessments and sensitivity analyses that the federal government or state governments might be doing?

Young

If you can map it on a regional scale at least, then we can include it in the protocol. That kind of a hazard, saltwater intrusion or changes in groundwater level, for example, is another important hazard, and those hazards have not been widely mapped in a consistent way that would allow us to include it into the existing protocol. There are some individual localities that have been looking at the changes in groundwater tables as sea level rises, looking at changes in salinization.

You could potentially, if you have good data in a location, include this into the exposure protocol and potentially sensitivity if you really understood the impacts to the infrastructure. We're not doing that at this at this point, and that's primarily because we don't have that data everywhere, and we only have it in a couple of places.

Bresette

If more infrastructure funding or more maintenance funding were made available to national parks, how do you think park managers would use the vulnerability assessments and sensitivity analyses that you're working on to build up or build out infrastructure in a cost effective manner?

Young

I have to say that there's no other group of folks that I work with in my job that are more interested in doing the right thing than park superintendents and regional park managers, facilities managers, at all levels all the way up to folks in Washington. They understand the value of federal dollars, they want to make wise decisions, and so I think that if there were infrastructure funds made available to the National Park Service they would be leaders in developing adaptation and resilience projects that would directly tap into this information that we're providing right now.

I could tell you one little story. Jeff West, who's the superintendent at Cape Lookout National Seashore. Cape Lookout has been battered by storms in the last five years, and he is actively utilizing a vulnerability assessment with hazards information like this to try and continue to serve visitors, but not in the locations that some current facilities exist, because those locations have proven to be too exposed and the infrastructure too sensitive. What really limits that park's ability to maintain good visitor access without wasting money is the funds' availability. We don't have an unlimited source of funds to make the best decisions possible all the time like we'd like to. I have a very high level of confidence the additional infrastructure funding that went to the National Park Service would utilize information like the vulnerability assessments we've conducted to do great things.

Bresette

How are other climate factors like change in temperatures, vegetation viability, implications for erosion, integrated or leveraged by the analysis that you do?

Young

In this particular case we are not assessing the impacts of climate change factors like temperature, and there are a wide variety of reasons for this. The scale that we're working at, on the scale of an individual park, the temperature change is impacting all of those assets uniformly, essentially. Second of all, there are some locations across the country where we don't even really understand the trends of some other climate change factors. In this particular case, because we're dealing primarily with coastal parks which face very real coastal storm impact hazards, coastal erosion hazards every single year that are dramatic and that are with us right now, the best place to start in making these adaptation decisions has been to start one of these particular hazards. That doesn't imply that some of those other climate change stressors will be important in the future, I have no doubt that they will, but our mission is really narrowed to these physical coastal hazards related to storms, flooding, sea level rise, and shoreline erosion, and geomorphic change.

Bresette

Great, thanks. This has been great, and before we started I sort of hinted that we might have an extra long Q&A session today, so I think we're living up to that. Thanks to everyone who's been sending us questions. Amber, I think you will get the last question of the session today.

Todoroff

Great. Rob, this has been so interesting, and one thing that you've been studying a lot and we've also been interested in this concept of retreat. So, how do these asset-level vulnerability assessments engage with that topic? It's very sensitive as I'm sure you know, but any thoughts on how this could inform that conversation?

Young

The interesting thing about retreat is that it almost never happens on the oceanfront. If you look at coastal resort communities and if you look at the really interesting retreat database built by [name inaudible] and her crew, almost none of the examples of retreat are from the oceanfront. They're all more inland flood plains, folks in their primary residence [inaudible]. The Park Service has provided us with some poster child examples of retreat, like the moving the Cape Hatteras Lighthouse, for example.

I think that with this kind of detailed information it's the end numbers that really matter. When you're thinking about relocation or retreat, if you have an asset that you deem of low mission priority, and the Park Service does have data on how important something is to their mission, and it's highly vulnerable but it's not really that important, you should not be spending any more money there. Those kinds of assets are key for maybe even decommissioning, if not moving.

On the other hand, if you have something that really is mission-critical and it's highly vulnerable, then that certainly is something that you want to be exploring the possibility of whether or not that can serve its purpose someplace else. Moving things is a lot cheaper than most people realize, and we can move anything, I promise you. So, one would hope that vulnerability assessments like this, whether it's being done within national parks or municipalities or an army base, would allow folks to target those things that are mission-critical and allow them to develop plans for how and where it could be moved. Or on the other hand, also looking at all of those things that

are absolutely not mission critical and be planning for their decommissioning unless they are very, very, easily moved.

Bresette

Thanks, Rob. Thanks very much for joining us today and making time and visiting your office and being with us today, it was a really great, really excellent presentation. And thanks to Amber and Amaury and Dan O'Brien and Ellen and everyone at EESI who helped pull off today's number two in the in our briefing series their briefing miniseries this week on climate adaptation data. Thanks again, Rob, that really means a lot for you to join us today. We're going to go ahead and call it there.

A quick reminder about tomorrow, noon Eastern, *Cultural Heritage and Climate Change*, the third of our online briefings in this miniseries. We hope you'll be able to join us. Another quick reminder, you can see on your screen there that's a link to take our survey. We'd love to know how you felt about today's online briefing. How you feel about the content, pretty much anything you'd like to share with us, but specifically interested in your feedback on this miniseries and how it's going for you. So please take a moment if you would to fill out that survey. A lot of people did yesterday, and it really does help us craft these in a way that's beneficial to policymakers and to the public. Also, in addition to serving as co-moderator, Amber is our editor of the Climate Change Solutions newsletter. The next edition, like I said, will drop a little bit later today. If you're not already signed up to get that, please visit EESI.org, you're missing out the great newsletter. It's a great way to stay informed about EESI and all things climate change policy, and if you've missed any you can view past issues online as well. You haven't missed anything; you just need to visit us online. We're going to go ahead and end it, thanks everyone. Hope everyone has a great rest of your Tuesday, and hope to see you back here tomorrow at noon for *Cultural Heritage and Climate Change*.

The Environmental and Energy Study Institute (EESI) is a non-profit organization founded in 1984 by a bipartisan Congressional caucus dedicated to finding innovative environmental and energy solutions. EESI works to protect the climate and ensure a healthy, secure, and sustainable future for America through policymaker education, coalition building, and policy development in the areas of energy efficiency, renewable energy, agriculture, forestry, transportation, buildings, and urban planning.