TRANSCRIPT

NOAA's Fifth National Climate Assessment Stakeholder Briefing

November, 16, 2023

NOAA External Affairs

https://www.noaa.gov/news-release/climate-change-impacts-are-increasing-for-americans

0:03

Hi everyone and welcome to NOAA's Briefing on the fifth National Climate Assessment.

0:08

My name is Dan Berry, I'm a program manager, and a physical scientist in NOAA's Climate Program Office and I'm so thankful that you've joined us today for this session.

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I have the unique and special role of serving as NOAA's representative on the National Climate Assessment Steering Committee, the Federal Steering Committee for the Report.

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And that role gave me a unique view of not only the report's entire production process from the initial e-mails until the final process of putting the website up.

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But also know as outsize role in producing the report.

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We supported the report, in many ways, some obvious, and some not so obvious, you may be surprised to learn that we provided legal advice to producing the report on how to execute it and author it.

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We of course contributed a vast array of data, scientific expertise, research, contributions, modeling, and many other technical contributions to the report.

1:00

And we also helped edit the report and produce the website providing scientific and grammatical editorial oversight of the report through our technical support unit down in Asheville, North Carolina.

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What you're going to hear today is a very small sampling of the many roles and contributions to the report, that we could talk about.

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But we're very excited to be able to share some of it with you today.

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We're fortunate on this call to have a number of senior agency leaders, as well as experts from six different chapters across the report, who served as authors and are going to tell you about some of the content.

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These individuals are going to speak to many aspects of the report, its production, and its contents.

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We're going to begin with remarks from doctor Richard Spinrad and doctor Sarah Kapnick.

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We also have, as I mentioned, select NOAA authors who served across the report on a variety of different topics, and then we'll pivot to Senior Advisor for Climate Ko Barrett who's going to wrap up the program. And then we want to hear from you and the question and answer session.

1:58

one small procedural note before we get started: this webinar is being recorded.

2:03

If you do not wish to be recorded, please disconnect at this time.

2:06

If you'd like to ask a question, please use the questions tool in the goto Webinar window and type a question for our speakers, which will be answered during the Q and A session, and thanks also to those who submitted questions in advance, which we will try to address.

2:19

Please be sure to state or type your full name, and your affiliation and organization when asking your question.

2:25

So, that's all for my introduction. I'm very excited to have the honor to be able to introduce NOAA's administrator, doctor Rick Spinrad, to make some comments on the report.

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Rick, whenever you are ready, go ahead, please.

2:36

Thanks, Dan, for that intro, and let me just add my thanks for all of your work and leading efforts now as efforts on NCA five.

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I was actually honored to attend the rollout at the White House on Tuesday and here, firsthand how valuable the effort is to arrange of decision makers and stakeholders. Like many of you on the call here today.

2:57

I urge you, if you haven't, if you weren't, didn't have a chance to watch it real-time streaming, take a look at the White House website to see the two panels and hear the comments that were made from a number of scientists and stakeholders.

3:10

This congressionally mandated national report does bring together hundreds of experts from federal, state local governments, as well as academic, non-profit, and private sector representatives.

3:22

It's a roadmap, to a better future through science based information, data, and real-world examples of ways to reduce greenhouse gas, to develop resilience strategies, among other things.

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At NOAA, our contributions reflect our agency's critical role and observing, predicting, and working with communities to build resilience to the effects of climate change that is at the heart of our mission to help create what we call a climate ready nation.

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A quick look at the report by some of the numbers.

3:55

Nearly 100 NOAA scientists and staff participated in the creation of the report.

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NOAA scientists were chapter leads, authors, and contributors for more than 20 of the 32 chapters in the report, including chapters on topics such as economics, oceans and marine resources, coastal effects, climate trends, Earth's system processes, and social systems and justice, and nearly every regional chapter.

4:21

NOAA also serves as the administrative lead agency for the report.

4:24

The Technical Support Unit, or TSU, made up of scientists, editors, data analysts, graphic designers, web developers, based at NOAA's National Centers for Environmental Information. And the co-operative Institute for Climate and Satellites provided some of the most essential support for the entire process.

4:43

NCA five outlines the challenges ahead, when you pair that with the administration's investments and things like the Bi-Partisan Infrastructure Law, and the Inflation Reduction Act, we have a plan of action.

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In the last month, I personally have had the opportunity to see how we're using federal dollars from BIL

5:00

and IRA in places as diverse as Puget Sound, where we're restoring salmon, habitat the Chagrin River in Ohio, where we're doing floodplain conservation in an urban area, and coastal New Hampshire rye specifically where we're funding culvert replacement to reduce flood risk.

5:19

Overall, our efforts are helping to build more capacity for underserved communities to support community driven restoration, create climate solutions by storing carbon, support, economic development, and environmental products and services, and provide employment opportunities, and the growing blue and green economies.

5:38

The fifth National Climate Assessment, will be used by policymakers, regional planners, adaptation, specialist's, states, tribes, businesses, educators, students, journalists, the general public.

5:51

It is truly the gold standard for climate information and it is a service to the nation.

5:58

With that, I'd like to turn it over now to our Chief Scientist at NOAA, Doctor Sarah Kapnick, for some additional insights, Sarah.

6:05

Thank you, DoctorSpinrad, and thank you all for coming. Without mincing words.

6:09

The fifth National Climate Assessment is a big deal, and marks the culmination of five years of incredibly hard work by so many. I am incredibly proud of the nearly 100 NOAA scientists and staff who participated in the creation of the report.

6:23

The report's conclusions are both harrowing and hopeful.

6:26

Make no mistake. The report does not sugarcoat things. Climate change is not only a serious problem, but we face dire consequences should we fail to take action to combat this crisis.

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Already millions of Americans are experiencing the impacts of extremes that are increasing in frequency and severity from hotter temperatures and longer heat waves to heavier rains, drought, flooding, wildfire and hurricanes.

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In the 1980’s, the United States experienced one inflation adjusted billion dollar disaster every four months.

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On average, now there's 1 every 3 weeks.

7:00

And as the National Climate Assessment makes abundantly clear, while we are all affected by climate change, we're not affected equally.

7:08

Underserved and overburdened communities face disproportionate risks and impacts from climate change.

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Every increment of warming matters, but there is hope.

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Across the country, mitigation adaptation efforts are underway in every single US region.

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And the US Greenhouse gas emissions have fallen since they peaked in 2007, all of this, while GDP and population have grown.

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You don't have to take my word for it. The National Climate Assessment includes case studies from communities across the US, highlighting local and state climate mitigation, adaptation actions, and uplifting collaborative efforts among cities and states to share best practices with neighbors.

7:47

Enough, for me, though, let's hear from some of the experts and authors of this groundbreaking and final report.

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And thank you so much, Doctor Kapnick and Doctor Spinrad for reflecting on the value of the report.

8:01

And it was incredible contributions and of course, for your support and championing the whole way in NOAA's production and leadership of the report. It was really great to have your support for the last few years.

8:13

We're now going to hear from six NOAA experts who served as authors on various chapters in the report, the breadth of topics that they're going to cover is a testament to the diversity and strength of not only the assessment, but notice contributions, as you've heard from our senior leaders so far.

8:28

The first individual up, is doctor Laurie Bruhwiler. Lori, whenever you're ready, go ahead.

8:33

Hi, I'm Lori Bruhwiler. I'm a Physical Scientist at the NOAA Global Monitoring Laboratory here in Boulder, Colorado.

8:39

My research has focused on greenhouse gas modeling and data assimilation, and I am one of the authors of Chapter three, Earth's System Processes.

8:49

In our chapter, we addressed the evidence that human activities are causing the Earth's climate to change.

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We also summarize current knowledge of the impacts on Earth's system processes of weather extremes, and we synthesized recent climate science advances.

9:04

Our key messages summarize our findings. First, we know unequivocally that humans have caused the climate change we see primarily through fossil fuel production and use. Changes in natural processes have made only small contributions to observe climate change. This is shown in our figure on the right where the green curve shows the calculated temperature change from well mix greenhouse gasses, from climate models.

9:28

The black line shows the observed change in global average temperatures, and you can see that aerosols in yellow have partially offset the warming due to greenhouse gasses.

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Second, improvements in our understanding of the Earth's system and climate feedbacks have enabled us to narrow the range of estimates of climate sensitivity, which is the global average temperature response to a doubling of the atmospheric Co2.

9:52

This range is very likely to be within 4.5 and 7.2 degrees Fahrenheit.

9:58

We also noted the importance of new climate observing systems and longer data records. Climate projections now use socio-economic pathways, meaning that we can explore how development and policy decisions affect future climate. We now also have the ability to use large model ensemble's to distinguish natural climate variability from human caused climate change.

10:20

Chapter three also looked at advances in our understanding of how human activities affect the Earth's system, including the land surface, cryosphere, oceans and atmosphere, and the cycles of water and carbon flowing through these are system components. Finally, we synthesized the evidence that human activities are likely changing the intensity, frequency and duration that extreme weather events, including heatwaves, extreme precipitation, drought, and wildfires.

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Our figure on the right illustrates how a sequence of consecutive extreme events can have cascading effects.

10:57

And now I'm going to turn it over to Russ.

11:05

Thanks, Lori. I'm doctor Ross Vose. I work at the National Centers for Environmental Information. I'm one of the many authors on chapter two, which speaks to climate trends.

11:15

And so today, I want to share with you three key messages from our chapter, starting with the first, which is, climate is changing and scientists understand why.

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Human activities have increased atmospheric levels of greenhouse gasses.

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Activities like burning of fossil fuels, deforestation, agricultural practices. Since the mid 19th century, carbon dioxide has increased about 50%, methane is up about 150%.

11:42

Global average temperature has risen in response by about two degrees Fahrenheit, since the mid 19th century, and I want to reiterate a point that Lori just made.

11:52

No natural processes known to science could have caused this.

11:56

Long term changes are evident in many other aspects of the climate system, like ocean heat content, sea level, and humidity have all increased

12:03

Meanwhile Arctic Sea ice, Glacier Mass and Greenland ice sheet mass have all decreased.

12:09

Warming over the Continental United States and Alaska is higher actually than the global average.

12:14

Since 1970, we've been warming about 70 or 60% faster than the globe as a whole, which equates to about 2.5 degrees Fahrenheit for the lower 48 and about four degrees Fahrenheit for Alaska.

12:26

It's also worth noting that most Eastern regions have gotten wetter during that period, in part because warmer air simply holds more moisture.

12:33

My second key message, extreme events, are becoming more frequent and severe.

12:38

Billion dollar disasters are a good indicator. Billion dollar disasters are rising, rising from a few different things from changes in climates, changes and exposure, meeting, who are what lies in the path of the disaster.

12:51

And changes in vulnerability, meaning the society's ability to cope and respond, and reinforcing, a point that doctor Kapnick just made a few minutes ago. In the early 19 eighties, the US experienced about one billion dollars disaster every four months or so.

13:05

And these days, we get one about every three weeks.

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The figure you see on the screen here now is actually a map of billion dollar disasters for this year to date.

13:15

We've had 25.

13:17

So we've already set a record for the most disasters per year in the US, and the year is not even over yet.

13:23

Temperature extremes are certainly changing, the number of hot nights, the frequency of occurrences of hot nights has increased.

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Meanwhile, the frequency of occurrence of cold days has decreased, and the frequency of hot days has been rising in the West.

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but one thing I'd like to point out is the Dust Bowl with the 1930's.

13:41

That's still the benchmark for extreme heat in the US climate record.

13:45

But more important, it's a historical reminder of the societal consequences of extreme heat, extreme heat that we could see again in the future.

13:54

Heavy rainfall has increased since the 1950's, especially in the east, particularly the number of extreme days, meaning events in the top 1% of the historical record.

14:02

And this increase has contributed to increases in river and stream flooding in those regions.

14:08

Evidence continues to build. Hurricanes are changing in dangerous ways.

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There's certainly been an increase in North Atlantic activity since the early 1970;s..

14:17

Hurricane activity has been intensifying or hurricanes have been intensifying more rapidly since the 1980's.

14:23

It causing heavier rainfall and higher storm surges.

14:26

Drought risk has also risen, particularly in the south-west.

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For example, the 21st century, the Colorado River flow during the first part of the 21st century.

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It was actually lower than in the 18th century by about 19%.

14:38

21st century soil moisture in the south-west was actually the lowest. It's been over the past 1200 years.

14:45

Finally, my last key message, how the climate changes in the future will depend upon choices made now.

14:51

As the world warms the nation is going to warm more.

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It'll be warmer basically everywhere, and even more so in the north and in the western part of the country.

15:01

A lot of the time the global scale, warming is expressed in global warming levels and degrees Celsius.

15:06

But if we talk about a warming level of two degrees Celsius, which is not a bad guess as to where we're headed, the US will warm about 4 to 5 degrees Fahrenheit.

15:16

For each additional degree of global warming, the US will warm another 2.5 degrees Fahrenheit.

15:23

There'll be other changes coming with a warmer world, things like much of the country, when we get wetter, the parts of the south and south-west could get drier.

15:30

Extreme heat, heavy rainfall will increase and storms will become more dangerous.

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The bottom line here is the more the planet warms, the greater the impacts and warming will continue if emissions do not reach net zero.

15:47

That's it for me. Now, I'd like to turn the mic over to doctor Michael Jacox.

15:53

Thanks very much Russ. My name is Michael Jacox. I'm an oceanographer working between NOAA's fisheries lab in Monterey, California and the Physical Sciences Lab in Boulder, Colorado and I was one of the authors on the chapter on ocean ecosystems and marine resources.

16:10

So the first thing I want to say, is there's overwhelming evidence that climate change is affecting the ocean. It's getting warmer, it's getting lower and oxygen and more acidic, And as we just heard about on land, the ocean has seen an increase in the severity of extreme events.

16:26

And these changes have had and will continue to have significant impacts on the United States marine ecosystems. Critical habitats, such as coral reefs and kelp forests have experienced large-scale degradation.

16:39

Marine species are rapidly shifting their geographic distributions.

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Those shifts have driven large-scale starvation events for ocean animals, such as sea lions and seabirds.

16:53

And while a lot of the effects that we see are or a lot of the effects in the ocean may be less visible than those over land, it's important to recognize that human well-being is closely tied to the ocean.

17:06

And climate change is disrupting our connections to the ocean.

17:10

So as an example, fisheries are suffering losses and this ranges from indigenous subsistence harvest to commercial fisheries for really highly valuable species like snow crab in Alaska or American lobster on the East Coast.

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Over the past three decades, federal fishery disasters have increased markedly.

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And they've accounted for over $3 billion in lost revenue, and over $2 billion allocated for Federal disaster relief.

17:40

And of those disasters, 85% were either partially or fully attributed to extreme environmental events.

17:48

So, that's the fisheries example, but other ocean related industries, such as tourism, recreation, transportation, and energy, are similarly facing substantial risks from climate change.

18:00

So, finally, I want to echo another point you've heard, which is that what we do today to reduce carbon emissions and build more resilient communities and economies will determine how climate change impacts our ocean in the future.

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There are promising adaptation options for the ocean.

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We can think of things like habitat restoration and the development of climate resilient fisheries management strategies, but without ambitious carbon mitigation, the range of adaptation options will narrow.

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It will become more expensive and more risky.

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So, responding to climate change quickly will improve outcomes, reduce costs, and allow the widest possible suite of adaptation options.

18:42

With that, I'd like to turn it over to our next speaker, doctor William Sweet.

18:50

All right. Thanks, Mike.

18:52

Hi. My name is William Sweet, I'm an oceanographer with NOAA's National Ocean Service.

18:57

I'm also a co-lead of US Federal Task Force and an author on the Chapter nine Coastal Effects.

19:05

I'm also a citizen of Chesapeake Bay Community on the front lines And I think this brings a lot too.

19:11

Brings the sides to life for me personally. I'll quickly highlight chapters three key messages.

19:18

The effects of sea level rise are occurring now.

19:20

Plain and simple, high tide flooding or nuisance or sunny day flooding occurs 2 to three times more often than it did just 20 years ago.

19:28

Primary driver is sea level rise, which was about one foot in the last hundred years, along US coastlines on average, higher, or lower in some regions for a variety of natural, and not unnatural reasons.

19:40

In the next 30 years, sea levels are on track to rise another foot.

19:44

History will repeat itself, but unfortunately in fast-forward.

19:49

Without action high tide flooding, events which are mostly disruptive today will increase 5 to 10 times and become outright damaging based upon today's footprint.

20:00

Second message: sea level rise is stressing both our coastal ecosystems and our communities.

20:06

March and habitats are getting squeezed between our waterfront development and high tide.

20:12

Saltwater intrusion is affecting fresh groundwater supplies and agricultural lands.

20:17

Water quality issues are emerging as septic fields fail, combined storm and wastewater systems overflow, Routine flooding, infiltrates, stormwater systems, floods streets, properties, and the urban environment.

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It's a dirty place, and if it's also raining - it’s a bigger problem.

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In short, flooding now happens for a garden variety of reasons.

20:38

It's impacted commutes, medical access, commerce - believe it or not, people don't want to wade through water to shop - public safety and property values.

20:47

The list could go on, and it does.

20:51

But adaptation is occurring, and it's helped measures vary by location.

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Solutions are found, typically found and funded locally.

21:00

First steps include installing back flow preventers. These devices that let rain out but not the tide's in are raising seawalls but other measures, as well. So just marsh restoration in nature based solutions that defend against tides and storm surges and restore ecosystem functions and habitat while promoting outdoor recreation access.

21:21

Hurricane proofing also helps, jacking up homes, adding freeboard into designs, or even storm gates.

21:28

These measures aren't necessarily intended to protect against sea level rise and tidal flooding.

21:33

So a proactive planning that really recognizes a full view of the threats from hurricanes to sea level rise is key, where, and how to adapt in a holistic manner, meaning, you know, it's cheaper to buy a car than one part, at a time, with keeping the community values.

21:50

Lastly, important conversations are being had around how to center equity in planning and implementation to help keep coastal communities dynamic and vibrant places with a deep hold on historic, cultural, and economic interconnections.

22:05

So, with that, I'll now pass it to Monica Grasso.

22:12

Thanks, William.

22:16

hello, my name is Monica Grasso, NOAA Chief Economist in the Office of the Chief Financial Officer.

22:25

And for the NCA five, I was the Agency Economics Chapter lead author.

22:31

And I'm very, very excited today to be here today, talking about the first economics' chapter in the National Climate Assessment.

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During this process, I had the pleasure to work with leading experts on economic impact of climate from academia, private sector, and other agencies as well.

22:53

In this chapter, we summarize the findings of more than 250 recent peer review studies and consulted with technical experts in different fields. The economic chapter assesses the present and projected effects of climate change on US markets, budgets, and the economic opportunities of American households, businesses, and institutions.

23:23

And we pay the particular attention to emerging scientific understanding of inequality of the impacts across the country.

23:35

So, we had the three key messages for our Chapter. First, Of course, climate affects the economy directly.

23:46

As we know, the vast majority of the economic activities across the US are dependent on climate, such as agriculture, transportation, tourism, healthcare, real estate, and others.

24:03

And while some economic impacts of climate change are already being felt, the impact of future changes are expected to be more significant across the sectors of the economy.

24:17

More frequent stream events and higher temperatures lead to direct economic losses via infrastructure damage, work injuries, crop losses, etcetera.

24:32

And current estimates of nationwide impacts indicate the net loss in the economic well-being of American society, are projected to be distributed, unequally, affecting certain regions, industries, and socioeconomic groups more than others.

24:52

For example, locations that are hot today are projected to suffer greater damage, because increase in temperature from 100 to 105 has larger effect on human health, energy use, labor supply and crop yields than the warming from 60 to 65 degrees.

25:22

Adaptation can attenuate some of those effects by reducing the vulnerability to climate change.

25:29

That can only occur when communities have access to technologies and opportunities that lower their vulnerability to harmful conditions at the affordable costs.

25:42

In addition, climate change also affects resources, then not treated in the form of markets, and therefore difficult to be quantified such as human health and ecosystems.

25:58

Next slide, Thank you.

26:01

Second message is that markets and budgets are already responding to current and anticipated climate change, and that stronger market responses are expected as climate change and progress.

26:17

So, as the risk of climate extremes grow, new costs and challenges will emerge in insurance systems, in public budgets that we are not originally designed to respond to those changes.

26:35

For example, anticipation of future flood risks has already begun to reduce prices of vulnerable properties. .

26:44

But there's still some barriers that prevent the market prices from adjust seems to reflect the climate risks, such as: inaccurate information, an incomplete understanding of the relevant climate risks.

27:02

And now, and the final key message is that climate change will alter the economic landscape of businesses, households, and the government.

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So, the changes in climate are expected to impose new costs to the US economy and potentially slow the economic growth.

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More frequent, extreme events can disrupt international trade, supply chains and foreign demand for American products.

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As climate change advances, economic risks are projected to grow over time.

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For example, the climate related disasters currently generate at least 150 billion per year in direct damages to the economy.

27:55

But before I close, I just want to say that while climate change threatens jobs and livelihoods in many sectors of the economy, economic opportunities can stem from America's climate change, mitigation, and adaptation responses.

28:15

Thank you.

28:16

Next, you'll hear from doctor Ariela Zycherman

28:22

Thanks, Monica.

28:23

Hi, my name is Ariela Zycherman. I'm a social scientist in NOAA's Climate Program office and a Program Manager for the Climate Adaptation Partnerships Program.

28:32

For the NCA five, I was an agency Chapter Lead for the Social Systems and Justice Chapter and an author on the overview chapter.

28:40

This is the first time the Social Systems and Justice Chapter's is being included in the NCA, along with the economics chapter, And as a first time chapter, which is multi-disciplinary across the social sciences, and includes contributions from anthropology, sociology, political science, environmental studies, communications, and many others. It has to offer frameworks for how to understand the relationships between climate change and social systems.

29:05

It's focuses specifically on the frameworks of social systems.

29:09

The institutions, policies, programs, practices, values, behaviors that shape our assumptions and activities around climate change, particularly those that cause injustices and those that can support justice oriented outcomes.

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You can hear the application of these frameworks across the NCA, and some of the chapters highlighted by the speakers on this webinar demonstrate those applications. So I wanted to highlight three major takeaways of the chapter.

29:36

The first is that social systems drive climate risks and shape how impacts are distributed.

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There are unequal benefits from the production of fossil fuels.

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And the risks and impacts of climate change are also distributed equitably.

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Structural inequalities formulate these outcomes, and these disparities are evident globally as well as nationally.

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This is part of our governance model, over time, which determines access to a variety of resources and formulate policies and regulations.

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An example of this comes from the Alaska chapter, which highlights that Alaska is warming 2 to 3 times faster than the global average, and many Native Alaskan and Tribal communities must now consider relocation for survival.

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These communities are not central producers of GHGs, and do not benefit from the production of them.

30:24

Face unparallelled burdens from climate change, like sea level rise, soil erosion permafrost melts, and changes in subsistence foods.

30:33

Coupled with long histories of displacement from their traditional lands and natural resources, these communities face an oversized burden and impacts from climate change.

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The next key message is that social system shape how we know about, talk about, and respond to climate change.

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People's experiences with climate change are not only guided by models and predictions.

30:56

They're guided by culture, traditions, economies, values, education, uses of and changes to their environments.

31:04

This diversity of approaches to understanding climate change also shapes how people respond to climate change.

31:10

For example, local knowledge in the northwest has an important role in guiding tribal landscape management, which not only mitigates climate hazards and risks but allows for a continued connection to cultural values and well being that the land provides.

31:26

Climate justice is possible if mitigation and adaptation processes are equitable.

31:33

Climate justice recognizes the inequitable distribution of resources and other social and political capital that impact the capacity for adaptation during upheaval created by climate change.

31:45

It builds on three dimensions of environmental justice: recognitional, distributional and procedural justice.

31:53

The concept of climate justice is tightly connected to efforts to achieve a just transition, which refers to mitigating and adapting to climate change in a managed process that ensures equitable access to jobs, environmental goods, and quality of life.

32:09

These actions have the potential not only to reduce risks, capture carbon, but also to redress past harms, and minimize social inequalities.

32:18

Some examples of adaptation and mitigating strategies, like migration and green infrastructure, can provide both co-benefits and opportunities to redress these past inequities for vulnerable communities.

32:29

For example, green infrastructure can reduce hazard risk from flooding, while simultaneously alleviate preexisting pollution, and offer access to green space.

32:39

But without deliberate and long term planning, and considers protections to avoid other potential displacements like gentrification, it can also perpetuate past harms.

32:49

To achieve a just transition, shifts and governance models need to consider, who is impacted by climate change, how they're involved in decision making processes, and how resources are distributed.

33:00

Sometimes these shifts are referred to as transformative adaptations.

33:05

The bright side of this is that we have many of the tools already developed. For example, co-production, which bring into the conversation local voices and knowledge to support inclusive, relevant, and equitable decision making.

33:18

And with that, I'll hand the floor back to Dan.

33:22

Yeah, thank you so much, Ariela, Lori, Russ, Mike, Billy, Monica. That was really a great overview of the work that you did, and I want to also thank you for your leadership in these chapters. The contributions are immense and of course, needless to say what you all covered barely scratches the surface of what's in your chapters.

33:44

I encourage folks on the call to go take a look at the report in full.

33:48

It's available at nca2023.globalchange.gov to explore the contents and the hard work that these folks and all of their co-authors did in their chapters. So I'm happy now to be able to introduce the Senior Advisor for Climate Ko Barrett.

34:03

She is going to speak a bit to the relationship between the National Climate Assessment and the Climate Ready Nation Initiative at NOAA. So Ko, take it away please.

34:13

Thanks, Dan. Hey, everybody.

34:16

Well, let me just start by saying how honored I am to be sharing time during this event.

34:21

With a small but mighty group of NOAA climate experts, representing significant swaths of NOAA's capabilities ranging from the core observations and physical science that we do that help us to understand how the climate is changing, to the social and human centered science, so essential to understanding the true impacts of climate change and ways to enact lasting and equitable solutions in communities across the nation.

34:50

It is this broad ranging expertise that puts NOAA at the center of Federal Efforts to help prepare the nation for a changing climate, to help build a climate ready nation.

35:02

Um, an undertaking as massive and ambitious as creating a climate ready nation really takes all of what NOAA has to give. From tracking the growing number of billion dollar disasters that number of folks have mentioned, so far this afternoon, to engaging in the co-development of solutions, applying forecasts of the future to the problems of today. From helping fishing communities to anticipate changes to fish stocks, to mapping and extreme heat and increasing flooding in underserved communities.

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And it involves more than NOAA. We all know this. No one entity can go it alone.

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It involves the contributions of Federal agencies, as diverse as Treasury and transportation, and HUD and FEMA.

35:52

It's driven by the needs of State, local, and tribal governments, and powered by the dedication of non governmental entities, including, the private sector, working to build our capacity to adapt to our changing climate, and stave off the increasing threats from fires and floods, extreme heat and drought, an existential changes to our oceans and coasts.

36:16

Just as the fifth National Climate Assessment is a foundational climate service that provides a snapshot of the challenges we face and the solutions that are within our grasp.

36:27

So too, is the work we are undertaking across NOAA, to build a climate ready nation to focus our climate expertise on providing practical support and ensuring equitable access to our climate data, products, and information.

36:43

So I just wanted to make a few short comments, don't want to take up much time here.

36:48

The focus is on our scientists, and I want to thank our scientists for your dedication to the drafting of this seminal report and advancing your expertise within NOAA to address the needs of the nation.

37:00

On the one hand, you have years of work behind you and on the other, we have much work to do together in the future. So I look forward to engaging on this as we move to the future. So, now, let me just pass this back to you, Dan, who will go into the question and answer section of our briefing.

37:19

Yeah, thanks so much, Ko. And we won't start talking about NCA six yet, but, but rest assured that folks are thinking about it already in the agency and inter-agency space.

37:28

And I really appreciated how you highlighted the way in which our agency is picking up the ball from NCA five, and carrying it forward, and working with so many critical partners on that work.

37:40

So thank you so much for the comments, Ko.

37:42

So we're going to go to the Q and A session, as Ko mentioned. We are going to use the question feature, and goto Webinar to solicit questions from you all, so please feel free to type those in.

37:54

We'll try to answer them in order. We also did receive some questions in advance of the webinar, so thanks to those of you who submitted questions in advance, and we're gonna work through those. Thankfully, we have a good amount of time now for Q&A and discussion with the authors of the report.

38:08

So thanks to all of the speakers for keeping it on schedule. Really appreciate that.

38:13

The first question that I'm going to open up with, while we get questions from the audience, the broader audience, is to kind of pick up on this theme that Ko started thinking about the way in which your work, your day-to-day work, meshes with this.

38:28

With the service that you provided, really on a more of a volunteer basis to, to participate as an author in the report. How are you working on topics that are identified in the report and the chapters that you lead in your day to day and, and what kind of things are you going to be carrying forward from the report.

38:47

And I think to do this, I'm going to work backwards through the order that we went in with the speakers. So, Ariela, if you, if you don't mind going first, I would ask you to tackle that with some thoughts from your own work in CPO, with the CAP Program.

39:00

And then we'll go to Monica, Billy, Mike, Russ and finally Laurie with this question. So, Ariella, go ahead, please.

39:08

Thanks, Dan.

39:10

So, the mission of the CAP Program, the Climate Adaptation Partnership program, is to build regional capacity for communities, and they're decision makers to equitably adapt to climate change.

39:21

And we think a lot about this governance model. How do we support climate science and how do we connect it to decision makers?

39:29

And a lot of the lessons from this chapter about recognition, distribution, and participation are embedded in our program. How we think about who needs support, what kind of site support they need, and how we can collaborate with them, with community members. To understand their needs and make sure that the science that we produce is relevant and usable at the place in which those communities request it. And part of that is thinking not only about those decision makers who have power to make decisions on a regional scale, but also those communities who sometimes get left out of those regional decisions And finding ways to include them as well. So, a lot of the lessons from the chapter are the things that we employ every day and are really turning to as we move forward and climate adaptation work.

40:16

Great, thank you, Ariela, we'll go to Monica next.

40:23

Thank you, Dan.

40:25

Yes, so, this is a great question, because we have been really, during the whole process of the chapter, working with many economists, we figure out that there's a lot still a lot to learn.

40:41

And one thing that I think was very clear to us is that we're not completely understanding the distribution of the impacts through different communities.

40:57

So, my team, I have a small team of economists here at NOAA, and we are looking at ways to create internal capacity, to make NOAA able to develop this type of analysis in the future, do more robust analysis and look at the inequalities of those impacts.

41:24

So, one thing we had recently, actually signed a joint statistical project with the Census Bureau that will allow us to link the NOAA fiscal data using their infrastructure.

41:40

With the socioeconomic and demographic data that will allow us to develop more robust models and look at impacts at different populations, different regions. So, that's super exciting. We're really looking forward to starting this work.

41:58

And we also working, and now, in developing our own capacity to look at the socio economic impacts of all these investments that we're doing through BIL and IRA, the infrastructure law and inflation reduction act. We are collecting a lot of information, developing database and planning to look at how our investments are impacting those communities. So I think there's a lot for us to learn.

42:35

that's great. Thanks a lot, Monica.

42:37

I'm gonna go to Billy next and Billy, you brought up in your comments. that you're a coastal resident, so you also live the work that you do very tangibly.

42:46

You don't have to address this if you don't want to, but if you want to bring in your personal lived experience, I think that that would be interesting to the folks on the line as well.

42:56

Yeah. So my day-to-day job definitely intersects with the work where you contributed to the NCA as well as, again, being a citizen of Annapolis Maryland, where we have a lot of flooding issues.

43:06

So not only are we concerned about what are sea levels headed in the next 20, 30 years, end of century, to give guidance for planners.

43:16

We're really also focused on the next season in the next year. Communities need to respond. How many days of flooding are we likely to have next year? So I can be budgeted correctly, to.

43:27

Have the the people, the pumps, the manpower, the people power the overtime too, to deal with it.

43:35

Whether it's public, or DOD, the Naval Academy, is there. They have the same issues, different bucket of money, different, you know, way of focusing it.

43:43

Personally, where I live, you know, these docks are going underwater In the last decade it should live a life that's calibrated to the tide gage, and I see it and we've got to replace things in our community, sit when docks go underwater. Downtown is also flooding, so, you know, you see it firsthand. You get the testimony from the community members that live there saying, We'd never seen waters this high except for hurricane, you know, a decade or two ago. And it's just, there's more and more reasons were flooding.

44:10

And communities are really starting to do something about and asking for information on what to expect next season next year, over the next few decades. And we're really trying to get that information and deliver the maps.

44:23

And that, you know, decision support is what we're after, You know, so we can crosswalk what, you know, folks need and what I need firsthand, you know, yeah, you look at the tide gage data. But then you look out in your backyard. You're like, this has happened. It's real.

44:37

I need to be involved in the solution space. And so it's a neat sort of crosswalk between professions and experience.

44:46

Yeah. Thanks for time that all together, Billy. The way that you live, your work is really of interest, for sure. I think we're gonna go to Mike next, Mike?

44:57

Yeah, well, for me, I think one thing, the report makes really clear on the ocean side is that we can't expect to respond successfully to climate change without explicitly incorporating climate into the management of the ocean.

45:10

Which may sound obvious, but it's not the status quo.

45:14

And, you know, we've seen off the California coast here like very clear sort of climate shocks during things like leading to unwanted interactions with wildlife like whale entanglements,

45:27

resulting in fishery closures, and all these kind of things.

45:30

Um, and this is close to home for me.

45:32

because the thrust of my day-to-day work is understanding how climate impacts the ocean and the things that live in it with the aim of informing better management to achieve both economic and environmental goals.

45:48

So this is, it's very well aligned for me.

45:50

And one thing I'm really excited about is that, yeah, in NOAA we've just launched something called the Climate Ecosystems and Fisheries Initiative.

45:58

And it sort of was built from this recognition.

46:02

And what it aims to do is put the provision of ocean information to support decision making in fisheries and other.

46:10

Other ocean sector's on sort of the same footing as weather forecasting.

46:14

Where NOAA actually just provides this information as a service reliably to improve outcomes for the ocean. So it's a really exciting time for us in that space.

46:27

Thanks a lot, Mike, for bringing up the Climate Ecosystems Fisheries Initiative.

46:30

I know that's very exciting activity, that really does build on a lot of the findings in the assessment, so I appreciate you mentioning that.

46:38

Russ?

46:41

Well, thanks Dan. I'm gonna give a slightly different answer here.

46:44

Think it's fair to say that NCA five work relates a whole lot to what we do here at the National Centers for Environmental Information. And I'll give you a couple of quick examples.

46:55

one of our main jobs is to keep score.

46:58

So, lot of folks out there are familiar with the Bureau of Labor Statistics, which comes out with a report every month saying how many people have gone on unemployment roles and such.

47:06

We have sort of an analogous role in terms of climate statistics.

47:09

So if you see a report that comes out, you probably did just a couple of days ago saying it was the warmest October on record for the globe. That's the sort of thing we do here.

47:19

We do the same thing on the spatial scale of the United States, and for the various states, and counties, and whatnot, and that obviously feeds right into what goes on in the National Climate Assessment.

47:29

We also spent a lot of our work on developing datasets, products, services, and reports that hopefully help build a climate ready nation in, that's not just my day job, it's probably where I really grew up in.

47:45

We look forward to doing more of that.

47:48

Just to be fair, I sort of keep score.

47:52

We might prefer to report other statistics than we have to.

47:55

I mean, Adam Smith does a great job. He's our key person on the billion dollar disasters report, but we don't really satisfaction, in saying

48:04

We have more billion dollar disasters this year than we've ever seen before, but it's our job. We don't enjoy saying it's the warmest October on record than it was five consecutive months in a row.

48:15

It actually depresses some of the people who work here, believe it or not, but it's our job and we're going to do it well.

48:21

I think moving forward, the other thing I'll mention is this has worked with Dan Berry and others.

48:25

We're going to try to move an effort forward to help pilot what are called NOAA Climate Projection Services.

48:31

There's a lot of great work going on in NOAA in this space already.

48:35

But the effort here would be focused on the co-development of new datasets and products and services that really help people adapt to climate change in the future.

48:44

And those are some of the ways we link NCA with the day-to-day work we get to do here.

48:51

Thanks, Dan.

48:53

Yeah, thanks a lot Russ, and thanks for bringing up the Forward Looking Projections Initiative as well, which is something that we're really excited about from, from IRA funding. I appreciate that.

49:01

OK, and finally, Lori.

49:03

Yeah, so in my part of NOAA, we keep track of climate forcers in other words, greenhouse gasses.

49:10

So, if you've ever seen the Mauna Loa time series of CO two in the atmosphere over decades, that comes from my lab.

49:17

And what we're doing in particular is trying to use models and those observations, along with space based data, to produce ever better understanding of where emissions are being produced, whether natural emissions are changing as the climate changes.

49:36

And my own specialty is methane, which I especially love, because everything we humans do has an effect on atmospheric methane, and it's important to point out that in some parts of the world, we just don't have very good information about emissions.

49:50

So, by the next NCA five, we hope to, you know, have a better understanding of emissions and contribute that.

50:01

Yeah, that's great, thanks, Lori. And so, so important for understanding the processes, but also being able to track emissions and thinking about that in a mitigation space as well, which is so important.

50:11

So, we had a question that came in, I want to thank you all for for tackling that and connecting the work and NCA five with our mission space and your, your day-to-day work and your positions at NOAA.

50:22

We had a question that came in in advance.

50:24

That was interested in some thoughts from you all on changes in precept patterns and concerns regarding flooding potential.

50:33

And I would kind of expand that a little bit. You know, Billy, you sort of got a bit into both coastal inundation, but also the freshwater flooding from terrestrial precipitation. And I think you know, ways in which that we're trying to address both of those sources of an inundation at the coastal zone. So, I'm going to ask, I guess Billy first, if you don't mind, talking a little bit to this question, and then also hopefully get some perspective from maybe Russ and Ariela as well. So, Billy, do you want to tackle this first?

51:03

Sure, Dan.

51:06

No increased precipitation. Heavier rains happening at a quicker rates.

51:12

Definitely is a problem at the coast.

51:15

Our first line of defense is our storm water systems at the coast, and a lot of these were put in the ground.

51:20

Decades ago, a century ago.

51:23

Downhill gradient, water rains, and it flows.

51:27

It goes away.

51:28

But, unfortunately, the same kind of systems that are producing rain also drive winds. And oftentimes these times where sea level is already risen and water is already is through the storm water systems backing up onto the streets.

51:41

There's no capacity left, so where's that rain go?

51:44

You know, people are trying to tackle this. Communities are takeling this by pump systems, expensive, but they work, to an extent, there's water quality issues.

51:53

But, uh, get the water off the streets. In an active pump system.

51:58

Charleston did this to make sure they had medical access to the hospital downtown.

52:02

Miami is doing it, Norfolk is considering it, it's a solution space, it's expensive, but that's a real problem, where the rain and the sea level is. Heavier rains and higher seas are just colliding at the coast and it's a problem, but it's something that communities need as they start planning their upgrade systems, or stormwater systems up tomorrow, need this board looking set of information that considers multiple water from multiple sources.

52:30

That will impact the system, some tenuously and so, we're, we're definitely trying to develop the information to provide those types of decision makers who are confronting this problem.

52:40

That's great. Thanks a lot, Billy. Russ, I was wondering if you want to pick up and just talk a little bit about some of the findings regarding precept changes in the report and your work as well on precept variability and change.

52:53

Sure, there, I think it's fair to say that we've seen increases in precipitation, particularly in the Eastern United States, over the past century, Northeastern, really, in particular.

53:05

We've seen increases in extreme precipitation than in most areas.

53:10

The projections going forward are for much of the country we'll see increases in average precipitation, except for perhaps parts of the South and south-west where we could see decreases.

53:22

This picture, of course is more nuanced when you get into the seasonal timescale and I'll let you read the report for those highlights.

53:28

But going forward was probably more salient as the direction that Billy was referring to, which is like extreme precipitation.

53:35

Because the warmer atmosphere holds more moisture, Extreme precipitation is expected to increase basically everywhere, and if the existing infrastructure isn't up to that challenge, then that's something that communities are going to probably have to address or just deal with the consequences. Because I realized that, you know, there's tradeoffs in any decision like that.

53:54

We have finite resources and how we deploy them is a difficult question, but I think it is fair to say that that challenge is just going to get greater.

54:02

There's no expectation that extreme precipitation is going to become less of a problem moving forward.

54:09

Great, thanks a lot, Russ.

54:11

Ariela, do you want to comment on this from a CAP perspective, social science impacts perspective, and also improve our ability as well, which is a key thing.

54:21

Sorry, OK, we've got a half-hour go!

54:27

Well, you know, what my two colleagues talked about. It's really compounding events when you have multiple different kinds of flooding, but that's not just in one event. It's over and over and over again. And there's a real trauma to the human experience when that happens.

54:41

There's a trauma to losing your home. There's a trauma to experiencing damages. There's a trauma to being scared, and there's a trauma to be not able to access recovery funds, and every time there's a new flood, it's hard to bounce back to the space that you already were.

54:54

And so when we think about flooding, we also need to think about the spaces in which it happens and how those solutions need to address all of those things.

55:02

And as part of the tradeoffs that I think Russ is talking about, is, how do we think of solutions that consider this, this trauma, over time, from complex events?

55:12

And we have an example in the CAP network from the community of Eastwick, which is in Philadelphia, that floods regularly. And the people of Eastwick are working with scientists to think, not only about the models that predict all of this kind of complex flooding and compound flooding, but also to sort of think through the solutions that would be most appropriate for them in a community that has been historically underserved and disinvested in. And so these are the ways that we think about the human experience in the context of compound events, and really can think about flooding is one of those places with a specific example in recovery funds and resiliency funds. And how to create a place for interdisciplinary science to really support that in the long run.

55:55

That's great, Yeah, and it also makes me think of a really prominent example, which reminds me of a comment Monica made, as well about some of our internal work with like the Census Bureau for example. In the report and the overview chapter, there's a graphic that shows flooding events.

56:09

And they've basically broken the percentage projected change in flooding events down by census tract and the percent of each census tract, as far as the black population in that census tract.

56:22

And it shows also the inequitable, projected effects of flooding and how population is not evenly distributed and the effects are not evenly distributed from an equity lens. So, there's a lot of that kind of content in the report, as well, that I think gives us additional power and relevance to our adaptation work.

56:43

There was a question. There were a couple of questions, actually, about the Great Lakes, in particular. Someone was asking about, changes in the Great Lakes regarding things, like water depth, fisheries, transportation, ports, water quality, and recreational uses? So, unfortunately, we have the perfect person to answer this.

56:58

Debra Lee, who's the Director of the Great Lakes Environmental Research Lab. She served as an author on the water chapter. She's not on our panel today.

57:06

But I do want to encourage folks, I think, to go to the report.

57:09

I think you'll find great information on this in both the Mid-west Chapter, which is number 24, as well as the water chapter. And I will mention one thing that USG GCRP is doing is organizing a webinar for each chapter. So, if you go to the global change dot gov website, and look at their events section, you'll find listings for each of the webinars, And I can tell you that the webinar for water is on December fourth.

57:34

And for the mid-west. It's on February 20th. And if you go to those, many authors from those chapters, well beyond. You're gonna get a very in-depth look at those chapters and topics like the Great Lakes.

57:45

I will say, the report doesn't have a Great Lakes chapter. And there is information on the Great Lakes across, probably at least 12 chapters in the report, including the mid-west and water chapter, but transportation, energy, et cetera. There is an excellent search function on the report, so you could search for Great Lakes, and come up with a wide array of coverage on that topic across the report. So I'd encourage you to engage with the report in, in those manners.

58:12

I'm going to go ahead to the next question, which is on how stakeholders can best utilize the findings of the NCA five.

58:22

And I do want to ask Ariela to tackle this first, if she's willing. But just add one point, which is that in addition to the report, which is on the NCA 2023 dot global change dot gov website. For the first time, there's also an atlas that was published, which allows you to really engage with the datasets.

58:39

The projections, the observations, that are featured in the report, and be able to kind of play around with that, and interact with that directly, outside of the more static content that's presented in the report itself.

58:52

So, I do want to put a plug in there for the atlas, but, Ariela, would you like to tackle this first, please?

58:58

I'm sure there's so many ways that people can use the NCA and, um, I think one of the primary ways is in regional decision making. The regional chapters really present a very targeted space for understanding what the climate impacts are, but also how it affects the people living in those spaces.

59:14

And I think together, understanding both sort of the projections and the risks along with the social stressors allows decision makers to say what would be an appropriate beginning to a response. And I think that's very unique in that in the National Climate Assessment.

59:30

There's also a lot of frameworks in the Social Systems and Justice chapter I mentioned before, frameworks for how to think through engagement.

59:38

Frameworks for how to think through equity and justice in the work that we do, as scientists, but also as decision makers.

59:44

And, and really thinking about how to apply those frameworks creatively in your own space. To say if these are the questions that I'm tackling, how can I do better to incorporate different kinds of voices and different kinds of data into my work?

59:56

And you can look to the regional chapters. You can look to the sectoral chapters. You can look to the response chapters and find examples of that if that's what suits you. But if you're not there, if you don't find yourself as being explicit in the report, you can find these frameworks very, very helpful to deciding what to do next and how to go about it.

1:00:13

That's great. Thank you for highlighting the many ways that stakeholders can really leverage the report and some of its tools and information and build off of that.

1:00:23

And we definitely like to think about the NCA as convening folks from the workshops that we hold at the beginning, to the workshops at the end, and really as a starting point for conversation and stakeholder engagement.

1:00:35

I know that we're at the hour, but I do think that we've booked to be able to go a quarter past and we have so many questions. I'd love to keep going if we can, so I'll, I'll do that unless I'm told to stop before 215.

1:00:47

I did want to also get a perspective from Billy as well because there are so many sea level tools and derivative products and input products that could be used as well. Do you want to highlight some of that, Billy?

1:01:00

Sure, sea level is such a clear signal: tides rising, and we've been tracking it, and we're mapping it.

1:01:08

So, I think, at a very fundamental level, the sea level rise scenarios that we have, and the information that we provide within the report of a trajectory, where are we headed in the next few decades? Let alone the end of the century, depending on emissions.

1:01:25

Water is not rising like it is in a bathtub.

1:01:27

It's rising at different rates at different places. Again, vertical and motion at that substance, groundwater withdrawal, you name it.

1:01:34

We factor these processes into the projections.

1:01:40

So at first stab, you can use NOAA sea level rise viewer, NASA, or Federal agencies, also, in support of this work as a site.

1:01:50

But you can actually go and see, where's high tide going to be, 10, 20 years, under the current trajectory, so that you can then start overlaying and seeing these intersections of what's in harm's way. We've also provided some derivatives to get at sort of graduating risk within FEMA's coastal floodplain. Something we're going to continue work on, as you mentioned, with the climate futures that Russ had mentioned.

1:02:14

So folks can get a sense of like, what's your tolerance? Is it a few days per year, 10 days per year, one day a year? You know, what? What are you defending against? What is is too much water? Too high? Too frequent? So we can start to, you know, using these sliders and seeing, you know what is it now?

1:02:32

How is it likely to change in the coming decades? And what does that mean to you and your asset or your system that you're responsible for?

1:02:39

So at a very fundamental level, let's see where high tide is headed.

1:02:45

It's great, thanks, Billy, for highlighting some of those, some of those tools. And I know, you know, you don't want to get an e-mail from every single person thinking about buying a property along the coastline. So we need to have tools so that Billy is not not inundated with messages to do that for everyone.

1:03:00

The next question that I wanted to touch on is whether anything stuck out to any of the authors is a big change from the last National Climate Assessment.

1:03:09

And, of course, we have two new chapters that were highlighted on this call by Monica and Ariela, and I think that's a logical place to start if they want to expand on some of their comments about those chapters.

1:03:20

Monica, would you mind leading off if you have any thoughts about about the way in which bringing economics into the rapport alters its utility and the way that it can be read in an impacts manner.

1:03:33

Do you have any additional thoughts you'd like to bring in on that?

1:03:37

Yeah, thank you. Yeah.

1:03:39

I think, for the first time, we were able to really have a comprehensive look at the current state of the knowledge on that economics of climate change, so that chapter gave the opportunity to have experts do a thorough lit review and really understand what we know, and what we don't know what research gaps was to have, too.

1:04:05

You know, invest seeing, and trying to understand, in terms of economic impacts for not just for the individuals, but for the country, and business institutions, and the government, as well.

1:04:19

So, we know we're all gonna be feeling the impacts of those changes, but having the opportunity of having the experts really look at, what we know, we don't know, and have more in-depth discussion.

1:04:37

I think it was s an amazing opportunity, and also the fact that we all really focus on looking at the distribution of those impacts, inequalities, and who are going to be the most vulnerable.

1:04:54

Folks, you know, under, under those changes.

1:04:57

And, it was very interesting for me to see, during our discussions that everybody is vulnerable in some way to those changes, either by age, health, income, location, etcetera. So this is very enlightening for me.

1:05:22

Thanks for sharing that, Monica.

1:05:23

I'm also wondering, and while you have the floor and we're on the topic of economics, there was a question that came in during your presentation earlier that's really interested in whether the econ chapter covers the financialization that's needed in order to address climate change particularly, you know, thinking about deploying renewables, Some of the work in the IRA. to try to advance the uptake of electric vehicles.

1:05:50

Is there anything in the economics chapter that points to that complex issue of trying to marshal financial resources and financial markets toward the type of change that is likely needed to address climate change, both from a mitigation and adaptation perspective? Yeah, not. Not specifically.

1:06:09

So, for this chapter, since it was the first chapter, we really want to have a comprehensive look at what the state of knowledge and the economics.

1:06:18

But we did work with the Adaptation Chapter and Mitigation Chapter to provide any information we could add to their findings.

1:06:29

We don't discuss any, any policy or any financial the analysis or needs.

1:06:40

But we do have a brief discussion about adaptation.

1:06:47

We'll need to kind of look like it has to be, you know, some We do need to give opportunity to folks and be affordable as well. And also, we did talk a little bit about innovations.

1:07:00

So, we have A section that talks about potential innovations and technologies that can help either in the mitigation side or adaptation side as well.

1:07:13

Great, thanks for addressing that, Monica.

1:07:15

So, going back to the question about what's new in NCA. Wanted to go to Ariella, and see if you wanted to add some thoughts as well.

1:07:23

Sure. Beyond the Social Sciences Justice Chapter and Economics chapter that are new social science chapters, there was a larger push across the NCA to incorporate more social science. And this is in response to stakeholder feedback inside the federal government and outside of the federal government. That it's really important that we situate climate change in the human context.

1:07:43

And so more than half of the chapters included a social scientist, whether an economist or one of the variety of other social sciences that exists on their author teams.

1:07:54

And what that really forced all the chapters to do is to articulate why climate change is important, and to who it's important, and what's happening to those people.

1:08:03

And part of that process is also the larger inclusion of new sorts of knowledge, traditional knowledge, local knowledge, indigenous knowledge, and how it can come together with Western knowledge to create a much more robust understanding of climate change and its impacts, and thinking about ways that we could respond to it that are equitable and thoughtful and relevant.

1:08:24

That's great. Thanks, Arielal, And yeah, I think that's interwoven throughout many of the chapters and cross chapter boxes as well in the report.

1:08:31

In an expanded way, significantly expand away from NCA four.

1:08:35

Russ, did you want to add something as well?

1:08:39

Sure, I want to add something in the opposite direction. Rather than say, what's, like, a different one of the emphasize. What's the same?

1:08:47

Um, a lot of the changes that have been observed have been changes that have been documented in previous national climate assessments.

1:08:56

So, we're actually, I think telling a very consistent story, whether it be Lori and her policy, talking about changes or increases in trace gasses, and the implications of those long term temperature.

1:09:07

Or, Michael talking about changes in the ocean, whether it be increased ocean acidity or ocean heat content having Billy talking about increases in sea level.

1:09:17

Or, in my case, our chapter talking about increases in temperature and changes in precipitation. These are the things that we've actually known for some time.

1:09:25

And while the details may vary a little bit for report to report, maybe chapters, discussions of life, estimates of future sea level, this may change a little bit. The direction hasn't changed.

1:09:37

The temperature has always been predicted to increase sea levels for them, predicted to increase, and so on and so forth.

1:09:44

So, I think, it's actually important to realize that some of these things aren't surprising. And I think we've been telling a very consistent story for the nation to help better prepare.

1:09:56

Great, Thanks a lot, Russ.

1:09:58

We're getting really close to the end, but there was one very juicy technical question that I want to be able to put to the experts on the call here.

1:10:07

There are a lot of angles to tackle this, and so, I'm just going to take a moment and see if we can get some responses to this. So, the question is besides the role of reducing, reflecting energy, what impact does the flow of freshwater from ice melting have on climate change?

1:10:22

And as I think about this question, you know, there are a variety of mission spaces at NOAA that I think are very sensitive to this freshwater influx that the questioner is talking about. Mike, I don't know if I could go to you first.

1:10:33

If you want to comment a little bit on how you know, the freshwater influx affects changes in salinity and nutrient profiles, also the idea of like sea ice as habitat and whatnot.

1:10:45

Um, could you touch on that a little bit?

1:10:48

Yes. Certainly the ice melts is very important for the ocean.

1:10:51

So, I think, as you alluded to, one of the, there are sort of direct physical implications, and no implication for the large-scale ocean circulation is one that gets a lot of attention when you get a lot of cold freshwater being dumped into the North Atlantic.

1:11:08

There's been much discussion about that changing the overturning circulation, which has large consequences for climate.

1:11:15

And there's some uncertainty about those dynamics and how they will play out, but it's certainly a mechanism by which that freshwater melt influence the ocean heavily.

1:11:26

But then also, yes, sea ice is very important for ocean ecosystems.

1:11:31

So, one, my nice example is in Alaska. The Bering Sea has sort of extensive sea ice there.

1:11:39

Sets up the cold pool, which is this area of very cold water that sits on the bottom of the Bering Sea. And it's critical habitat for many species. And these are not only sort of ecologically important species, but some of the most valuable fisheries in the nation.

1:11:55

Rely on this habitat.

1:11:56

So when you have the ice go away, you similarly have the ocean habitat go away.

1:12:02

Um, and that there are big ecological implications.

1:12:07

Thanks a lot, Mike, And I'm also wondering, Billy, would you mind sharing a little perspective, as well on, on some of the contributions to sea level rise and how we're trying to understand them, you know, especially from the loss of land ice.

1:12:21

Sure, well, cooking up, sea level rise, right now, I'll be one part thermal expansion.

1:12:27

two parts, contribution for a melt of land base, I excuse me, not sea ice that's already on the land base ice - Antarctica, Greenland, mountain glaciers, that contributions increasing that's taken over the thermal expansion component that's the wildcard that we're really watching.

1:12:43

So adding to global sea level rise as we melt land based ice, the other factor that Mike brought up, circulation changes the circulation of the North Atlantic.

1:12:52

You know, there's over a meter of sea potential sea level rise bound up right now in the Gulf Stream.

1:12:57

Now, that does speed up and slow down naturally. When it slows down, increase the sea level again. You see a lot of it in the East Coast United States, and it's sufficient oftentimes to cause flooding.

1:13:07

So there's indications, with a freshening with a reduction in the overturning circulation, a slowdown of the Gulf Stream system, if you will, that could have significant consequences and future sea level rise.

1:13:17

It's an area of research that it's still being, you know, actively pursued of what might happen under certain amounts of freshening and melt.

1:13:26

But it's a concern because waters have gotten to the brim and many coastal communities and it doesn't take much to flood. Now, slow down the Gulf Stream, if it is sustained, it just means additional sea level rise, additional flooding.

1:13:41

Yeah, I think you, you highlight it, I mean, a lot of people understand that, as the ice on the land melts and goes to the rivers and streams at the ocean or raises sea level.

1:13:50

And you highlighted maybe a less known feature of the currents and how those can drive regional sea level.

1:13:55

I was wondering if you could also really, briefly just touch on another, I think, surprising finding, which is, how the loss of the major ice sheet mass actually changes the gravity field of the planet. Can you just touch on that really quickly as a source of regional sea level rise?

1:14:10

Sure. Gravitational rotation and deformation will affect so, believe it or not. there's two miles of ice in Antarctica and Greenland.

1:14:18

And it just imparts gravity. It just is. It's not something that waxes and wanes.

1:14:22

It's there And as we melt these major ice sheets and we redistribute the mass, the gravitational, and the rotational effects of the earth will change.

1:14:32

Usually it has the far field effects, meaning if you're close to that source of Greenland and it melts, you might not feel all the rise associated with that melting because you're close to it and and as the mass reduces or and the gravitational relaxes.

1:14:50

It will actually cause some set down of water close but increase the water far away.

1:14:54

So, you know, what's far away from all the ice sheets, Hawaii, you know these areas that you're not even close, but you're going to have an amplified effect.

1:15:02

So, it might seem esoteric.

1:15:04

Gravity is real and it's something that we factor into the sea level rise projections because we understand it really matters where ice melts matters.

1:15:13

We even have these efforts at NOAA to measure the gravitational field of the planet too, which is kinda cool.

1:15:20

Really, no scientific area that's related to this. We are past 2:15 mark. I did, I know we haven't really had many questions to pose to Lori.

1:15:30

We did have one question on the work that NOAA has done to look at paleoclimate.

1:15:38

And I was wondering if you could maybe touch a little bit on some of that work and how scientists are looking at past climates as analog for, for the current climate. And then I think this will be our last question so we can close it up.

1:15:50

I really love thinking about paleoclimate, I think it's super interesting, and it's key in our understanding of how the climate system works.

1:15:59

In my lab, some of us have been involved in collecting and analyzing ice core information to figure out what past greenhouse gas abundances may have been. You know, we haven't done much, much else other than that.

1:16:15

But an example of something that was concluded by some of my colleagues was that natural emissions of methane from geologic features like mud volcanoes and seeps was likely pretty small in pre-industrial times at least as shown by the ice cores. So that's important because if natural geologic admissions are small, then we need more fossil emissions to balance the budget that we see in our data.

1:16:45

So paleoclimate can be very useful. And I'm sure other NOAA scientists are, you know, doing climate model studies as well.

1:16:53

I haven't been involved in any of those personally, but I think it's fascinating.

1:16:57

Yeah. It's really important. Work to contextualize what's going on now. And thanks for highlighting some of that, Lori.

1:17:05

Well, I think we're gonna have to call it quits.

1:17:06

We can definitely go on probably for the rest of the day, talking about all of these interesting science topics and the depth of the work that you all do in support of understanding our climate system better. But unfortunately, we do have to leave it there. So I want to thank a number of folks.

1:17:21

I want to thank all of our senior leaders for taking the time today to really show and demonstrate how important this report is, and how valued NOAA’s contribution is.

1:17:31

I want to take the time to thank, of course, our authors who attended today, and provided their perspective and information from their chapters, and to thank them and all the other authors who may be listening or watch the video recording of this for the incredible amount of work that you've done. It takes a lot to produce the National Climate Assessment.

1:17:51

This is no one's job to do it. These folks, that you're seeing on the line, they're not paid to participate in the climate assessment, this is something that's really important for us to contribute to.

1:18:01

It's a great outcome of our research, and, and so it's, it's a, it's a shared mission to really put this best report possible out to the public, and to infuse it with our best science from the agency, and our agency partners, and academic partners, private sector partners, as well.

1:18:17

So, just hearty, thanks to you all for, for the work that you've done to make this report the best report possible.

1:18:24

And then our Technical Support Unit, which has been called out, a number of times, an extraordinary group of folks down in Asheville, North. Carolina, who make this report fundamentally possible. They're not always as visible as some of the authors are, but they're contributions are absolutely essential to the report, and we're so grateful to be able to work with them and receive the benefits of their hard work.

1:18:47

And thanks to all of the attendees as well. We hope, and know that this is just the beginning of communication around the National Climate Assessment. They're going to be many other ways to engage at NOAA and also outside of NOAA. So, I hope that you'll visit the report website, visit, the Atlas, attend, some of the webinars, and help also spread the word of this report to folks who could benefit from the knowledge contained in it and engage with the art and the poetry that's in it as well.

1:19:12

So, thank you so much for attending. And thanks to all of our speakers for taking the time, and this is the end of the webinar. Thank you.

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