

# Climate Needs Assessment for New York State

Final Report | Report Number 20-31 | October 2020

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### **Mission Statement:**

Advance innovative energy solutions in ways that improve New York's economy and environment.

### **Vision Statement:**

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

# Climate Needs Assessment for New York State

*Final Report*

Prepared for:

**New York State Energy Research and Development Authority**

Albany, NY

Amanda Stevens  
Project Manager

Prepared by:

**Columbia University**

New York, NY

Anna L. LoPresti  
Radley M. Horton  
Daniel A. Bader  
Project Managers

## Notice

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## **Abstract**

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As climate change continues to impact New York State, science-informed decision-making is needed to address growing risks. Climate assessments are a frequently utilized source of information for climate action planning and implementation. In 2011, the New York State Energy Research and Development Authority (NYSERDA) released a statewide climate assessment: Responding to Climate Change in New York State (ClimAID). In 2014, updated climate projections were published. NYSEDA is now considering a third iteration of the statewide assessment, recognizing that participatory processes improve the usability and underscore the salience of assessments. This needs assessment aims to directly incorporate diverse input into the forthcoming climate assessment through an analysis of current use, future needs, and existing gaps in climate information. An online survey was distributed across the seven climatic regions of New York State, and semi-structured interviews were conducted to gather sector-specific information regarding preferences for climate variables, time horizons, and emission scenarios. By incorporating feedback into state-level climate assessments, information will be increasingly fit for use and contribute to the long-term resilience of New York State communities.

## **Keywords**

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ClimAID, climate assessment, climate change, climate information, needs assessment

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## Acronyms and Abbreviations

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|       |   |
|-------|---|
| BIPOC | black, Indigenous, and people of color    |
| IPCC  | Intergovernmental Panel on Climate Change |
| NPCC  | New York City Panel on Climate Change     |
| RCP   | Representative Concentration Pathway      |
| REDC  | Regional Economic Development Council     |

# Executive Summary

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As climate change continues to impact New York State, science-informed decision-making is needed to address growing risks. Climate assessments are a frequently utilized source of information for climate action planning and implementation. In 2011, the New York State Energy Research and Development Authority (NYSERDA) released a statewide climate assessment: *Responding to Climate Change in New York State (ClimAID)*. In 2014, updated climate projections were published. NYSEDA is now considering a third iteration of the statewide assessment, recognizing that participatory processes improve the usability and underscore the salience of assessments. This needs assessment aims to directly incorporate diverse input into the forthcoming climate assessment through an analysis of current use, future needs, and existing gaps in climate information. An online survey was distributed across the seven climatic regions of New York State, and semi-structured interviews were conducted to gather sector-specific information regarding preferences for climate variables, time horizons, and emission scenarios. By incorporating feedback into state-level climate assessments, information will be increasingly fit for use and contribute to the long-term resilience of New York State communities.

# 1 Introduction

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The impacts of climate change are already affecting every region of New York State. While the State has taken steps to mitigate and adapt to a changing climate, further actions are needed to address the growing risks to communities. State-level climate assessments are a frequently utilized tool for providing spatially explicit climate information to inform mitigation and adaptation strategies. In 2011, the New York State Energy Research and Development Authority (NYSERDA) released a climate assessment: *Responding to Climate Change in New York State (ClimAID)*, which provided historic climate data, current impacts, and climate projections for the State. In 2014, an updated set of climate projections was released. NYSERDA is now considering a third iteration of the statewide assessment to ensure access to information that is localized, relevant for decision-making, and reflective of a wide range of needs for climate information users across the State.

There is increasing recognition in the field of climate science of the need for participatory processes in the production of climate information (Meadow et al. 2015). Many frameworks including but not limited to community science (Wandersman 2003), sustained assessment (Moss et al. 2019), co-management (Olsson et al 2004), and participatory monitoring and evaluation (Bours et al. 2013) support the finding that increased participation from diverse stakeholders in the production of climate science research improves the quality, usability, and uptake of information. Additional benefits include trust and relationship building that result from cooperative research (Cash et al. 2006). In accordance with the principles of participatory research, NYSERDA aims to include feedback from a diverse set of current and potential users of climate information into the next iteration of the climate assessment. One component of this process is a climate needs assessment to determine: the current uses of climate information for stakeholders and governments in a range of sectors across New York State, future needs of climate information, and barriers to utilizing climate information. Incorporating user feedback into State-level climate assessments contributes to the adaptive capacity and resilience of communities across the State.

## 2 Methods

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### 2.1 Survey

An online survey was distributed to current and potential users of climate information across New York State using Qualtrics software, and 102 responses were collected between April 28th and June 5th, 2020. The survey team utilized a list from the 2011 ClimAID report: Appendix B. Stakeholder Organizations Engaged in ClimAID Assessment as a baseline set of groups involved in the prior assessment process. In order to reach those who did not participate in past ClimAID efforts, a document analysis of climate action and resilience plans in New York State was conducted to identify localities for outreach, utilizing a database of planning documents compiled by the Consortium on Climate Risk in the Urban Northeast. Sources included The Climate Adaptation Knowledge Exchange, the Georgetown Climate Center, The National Congress of American Indians, the Urban Climate Change Research Network, and The University of Oregon Tribal Climate Change Guide. References listed in those documents were used to identify additional plans and communities. Survey respondents were asked to suggest additional participants or organizations, which were then included in subsequent survey distributions as part of a snowballing technique to widen the audience. The survey was distributed via email through Qualtrics and shared with relevant New York State Energy Research and Development Authority (NYSERDA) and Columbia email listservs.

### 2.2 Interviews

Interviews were conducted between May 8th and June 4th, 2020 to gain detailed understanding of climate impacts and information needs across a range of sectors. Interviews were semi-structured (Kvale and Brinkmann, 2009), using a prearranged interview guide but allowing for flexible trajectories (Cohen and Crabtree, 2006). Sixteen interviews were conducted with participants from the original 8 ClimAID sectors (energy, transportation, tele-communications, public health, water resources, coastal zones, ecosystems, and agriculture) as well as individuals from local government with a broad environmental mandate. Interviews were conducted remotely over the telephone, recorded, and transcribed. All interview protocols adhered to Columbia University research standards for social distancing in response to COVID-19.

## **2.3 Data Analysis**

Interviews and survey responses were uploaded to Nvivo12, a software program for qualitative research used to analyze text and audio data. Information was coded based on a preliminary organizational structure provided by NYSERDA outlining a vision for the upcoming assessment. Results are organized by the following assessment components: ClimAID Outputs, Climate Projections Update, Research Gaps, Case Studies, Economic Impacts, and Stakeholder Engagement. An additional section on crosscutting themes is presented, which were identified through text analysis using iterative coding and memos. The process of writing memos is intended to clarify themes and emerging trends within observations or qualitative data (Charmaz, 2006). Respondents were organized into case classifications based on sector of work and geographic region for further disaggregated analysis.

# 3 Needs Assessment Results

## 3.1 Respondent Demographics

This section presents information on survey and interview participants by region, organization type, sector of work, and familiarity with and/or use of ClimAID.

### 3.1.1 Survey Respondents by Region

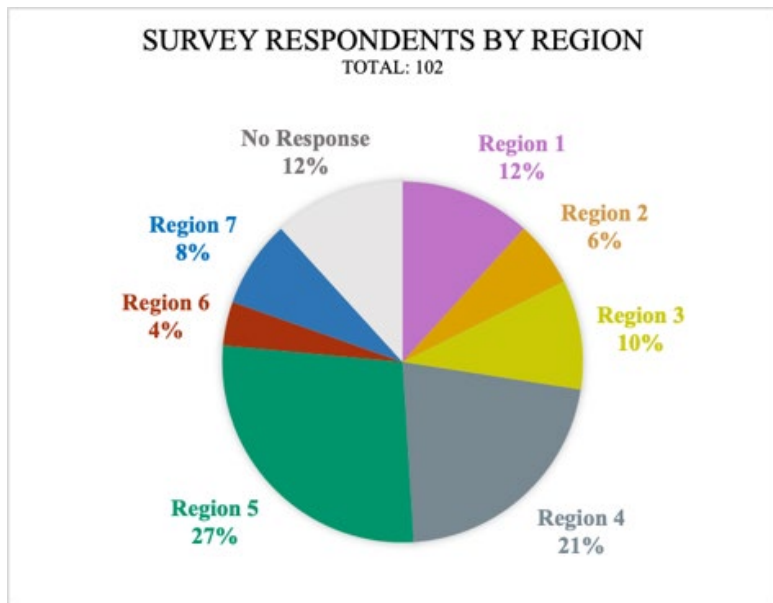
In the 2011 ClimAID Report, New York State was organized into seven climate regions for the purposes of providing climate projections at the sub-state scale (Figure 1). To determine the geographic distribution of participation in the needs assessment, respondents self-selected the ClimAID region of their primary work location.

**Figure 1. ClimAID Regions and Representation**

Map of climate regions as delineated in ClimAID 2011.



**Figure 2. Percentage of Survey Respondents Representing Each Climate Region by Work Location**

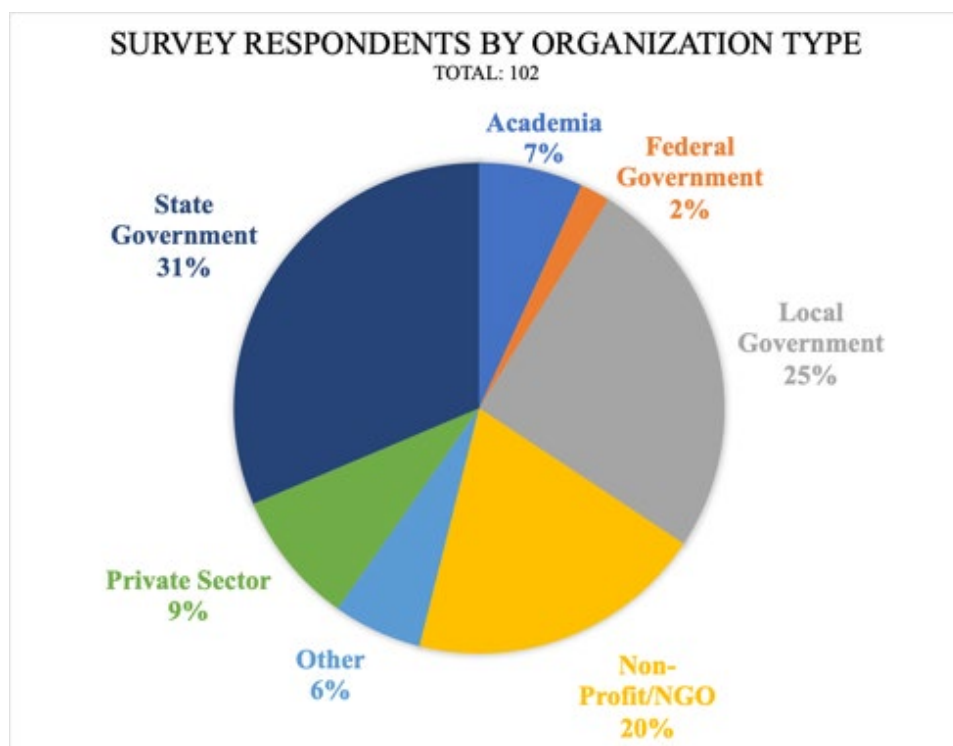


The highest representation was from regions 5, East Hudson and Mohawk River Valleys, and 4, New York City and Long Island (Figure 2). This distribution generally reflects patterns of population density driven by New York City, the Eastern Hudson Valley, and Albany. There is relatively lower representation from Region 6 (Tug Hill Plateau), indicating potential outreach is needed in other phases of the ClimAID process to better capture the unique priorities of this area.

### **3.1.2 Survey Respondents by Organization Type**

Over half of participants identified as government employees, with highest participation from State (31%) and local (25%) government, and relatively lower participation from federal government (2%, Figure 3). Despite comparatively high coverage in the government sector, there were no respondents from tribal government. Absence of tribal government input is a gap which contributes to environmental injustice at the procedural level (Foster et al. 2019). Outreach is needed in other phases of research to correct this gap and to build relationships to reduce the likelihood of similar results in the future. Other sectors that may benefit from additional outreach include academia and the private sector—each represented less than 10% of total respondents.

**Figure 3. Percentage of Survey Respondents by the Type of Organization**



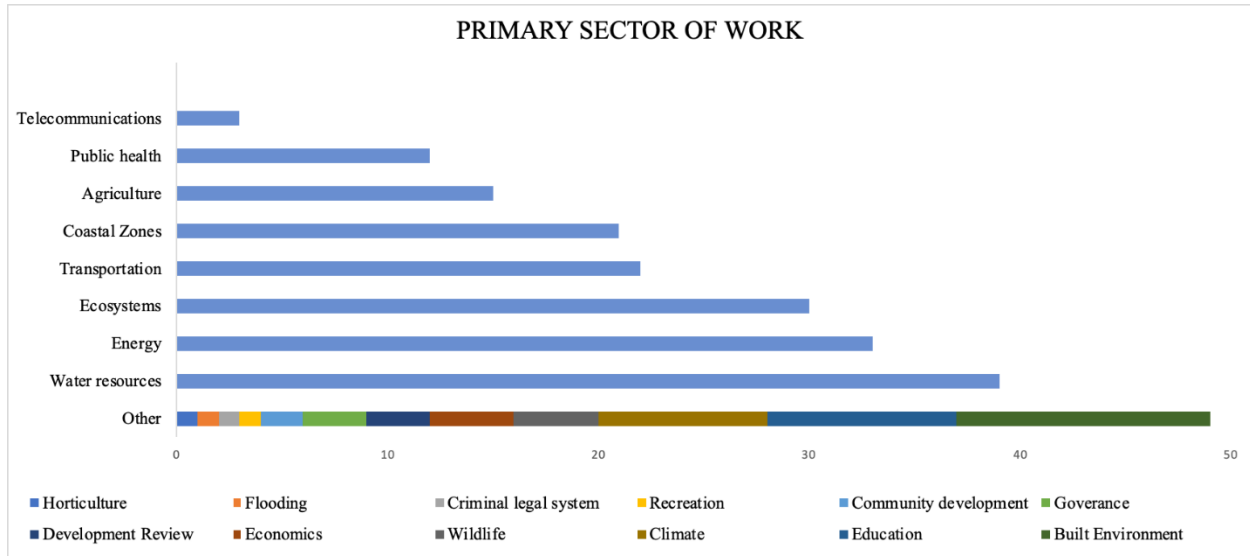
### 3.1.3 Survey Respondents by Work Sector

In the 2011 ClimAID Report, information was provided on climate change impacts and adaptation for eight sectors: water resources, coastal zones, ecosystems, agriculture, energy, transportation, telecommunications, and public health. Survey respondents self-selected their primary sector(s) of work based on the eight sectors, also listed in Figure 4. Of these ClimAID sectors, the highest percentage of respondents identified their sector of work as water (38%), followed by energy (32%). The sectors with the lowest representation are telecommunications (3%) and public health (12%). However, nearly half (46%) of respondents specified “other” primary sectors of work, receiving more responses than any of the listed ClimAID sectors. The write-in responses were aggregated by general topic areas; based on this categorization, the three most commonly identified additional sectors of work were the built environment, education, and climate. The significant proportion of respondents specifying a primary sector outside of the options offered indicates that the current ClimAID sectors may not be fully capturing the range of work considered relevant to or impacted by climate change in New York State. Potential options for incorporating sector feedback into the forthcoming ClimAID assessment are explained in detail in the ClimAID Outputs section and include expanding the sectors as well as integrating the topic areas mentioned here more explicitly into the existing sector chapters.



**Figure 4. Percent of Survey Respondents Identifying the Eight ClimAID Sectors as a “Primary Sector of Work”**

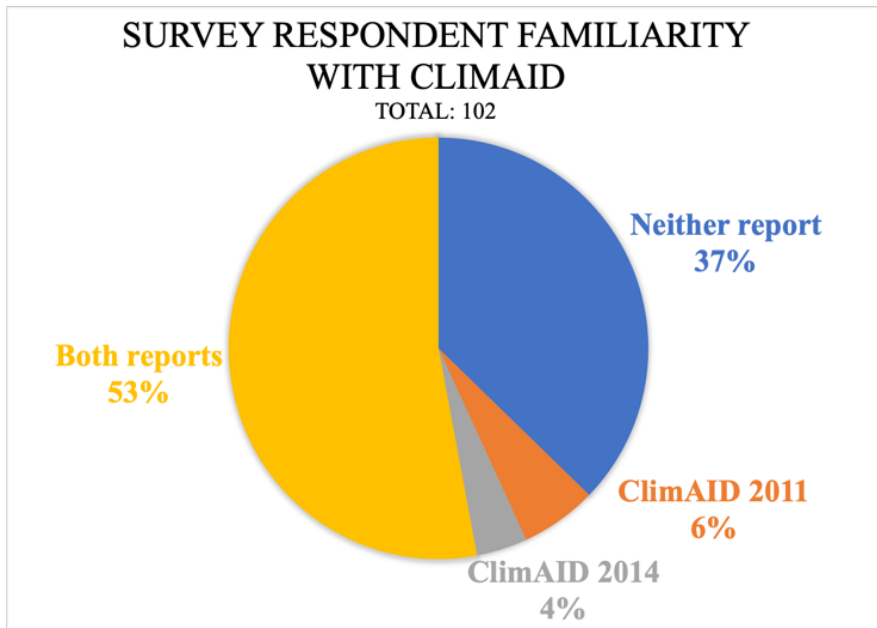
Individuals can select multiple sectors. The category Other indicates the percent of respondents identifying a primary sector of work outside of the ClimAID sectors, aggregated by subject area.



### 3.1.4 Survey Respondents by Familiarity with ClimAID

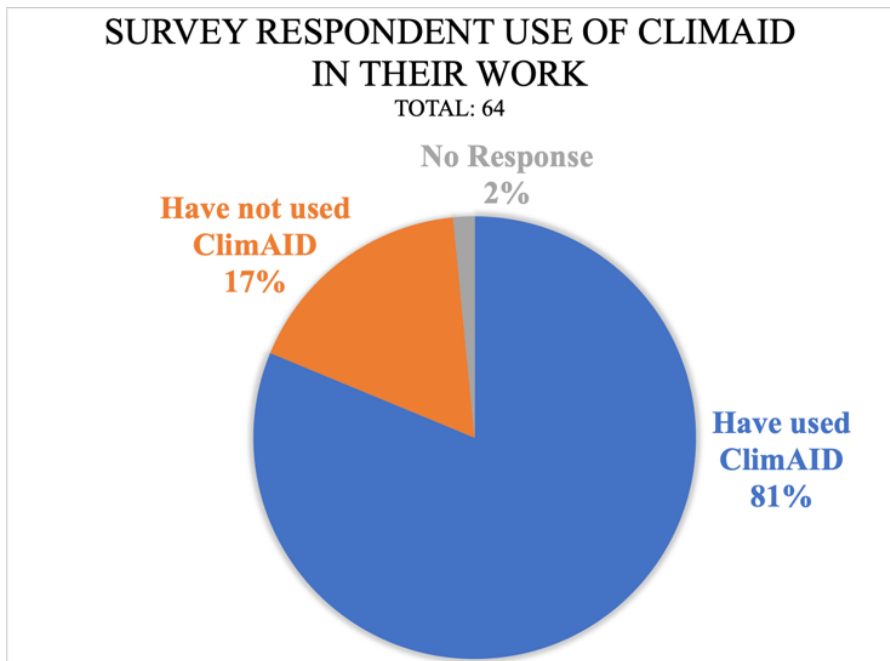
Over half of survey respondents were familiar with both the 2011 and 2014 ClimAID reports (53%), while 37% were not familiar with either (Figure 5). Notably, very few participants were aware of one of the reports but not the other. Participants’ open-ended responses to how they learned about ClimAID suggest that familiarity with ClimAID is strongest within government-related groups that are already aware of NYSERDA’s work more generally.

**Figure 5. Percent of Survey Respondents Familiar with the ClimAID Reports**



**Figure 6. Percent of Survey Respondents Who Have Used ClimAID in Their Work**

These respondents were also familiar with at least one of the ClimAID reports.



Of those who were familiar with both reports, 64% were from government sectors (44% State government, 18% local government, 2% federal government). As NYSERDA is a State entity, it is not surprising that government employees—and state-level government employees specifically—were either targeted for outreach or became aware of the reports through informal channels. Strategic outreach to non-government users of climate information may therefore expand the reach of the ClimAID update. The vast majority of those who were aware of ClimAID had also used the reports professionally. Of respondents who indicated they were familiar with one or both reports, 81% had used ClimAID in their work (Figure 6).

### **3.1.5 Interview Respondents**

Interview respondents were identified based on sector of work, with efforts made to capture diversity along other metrics including geography and organization type. Interviewees represented six of the seven ClimAID geographic regions, all eight ClimAID sectors plus an added environmental governance sector, all specified organization types, and included those who were both familiar and unfamiliar with ClimAID (Figure 7). Due to the limited number of interviews, additional respondent details are omitted to ensure confidentiality.

**Figure 7. Interview Demographic Chart for the 16 Interviewees**

| Geography                    | participants | coverage                            |
|------------------------------|--------------|-------------------------------------|
| Region 1                     | 1            | <input checked="" type="checkbox"/> |
| Region 2                     | 2            | <input checked="" type="checkbox"/> |
| Region 3                     | 2            | <input checked="" type="checkbox"/> |
| Region 4                     | 7            | <input checked="" type="checkbox"/> |
| Region 5                     | 3            | <input checked="" type="checkbox"/> |
| Region 6                     | 0            | <input type="checkbox"/>            |
| Region 7                     | 1            | <input checked="" type="checkbox"/> |
| <b>Sector</b>                |              |                                     |
| Agriculture                  | 1            | <input checked="" type="checkbox"/> |
| Coastal                      | 2            | <input checked="" type="checkbox"/> |
| Ecosystems                   | 2            | <input checked="" type="checkbox"/> |
| Energy                       | 2            | <input checked="" type="checkbox"/> |
| Environmental Governance     | 2            | <input checked="" type="checkbox"/> |
| Public Health                | 2            | <input checked="" type="checkbox"/> |
| Tele-communications          | 1            | <input checked="" type="checkbox"/> |
| Transportation               | 2            | <input checked="" type="checkbox"/> |
| Water                        | 2            | <input checked="" type="checkbox"/> |
| <b>Organization</b>          |              |                                     |
| Academia                     | 2            | <input checked="" type="checkbox"/> |
| Local Government             | 4            | <input checked="" type="checkbox"/> |
| Non-Profit/NGO               | 4            | <input checked="" type="checkbox"/> |
| Other                        | 1            | <input checked="" type="checkbox"/> |
| Private sector               | 2            | <input checked="" type="checkbox"/> |
| State Government             | 2            | <input checked="" type="checkbox"/> |
| Tribal Government            | 1            | <input checked="" type="checkbox"/> |
| <b>Familiar with ClimAID</b> |              |                                     |
| Yes                          | 15           | <input checked="" type="checkbox"/> |
| No                           | 1            | <input checked="" type="checkbox"/> |
| <b>Used ClimAID</b>          |              |                                     |
| Yes                          | 7            | <input checked="" type="checkbox"/> |
| No                           | 9            | <input checked="" type="checkbox"/> |

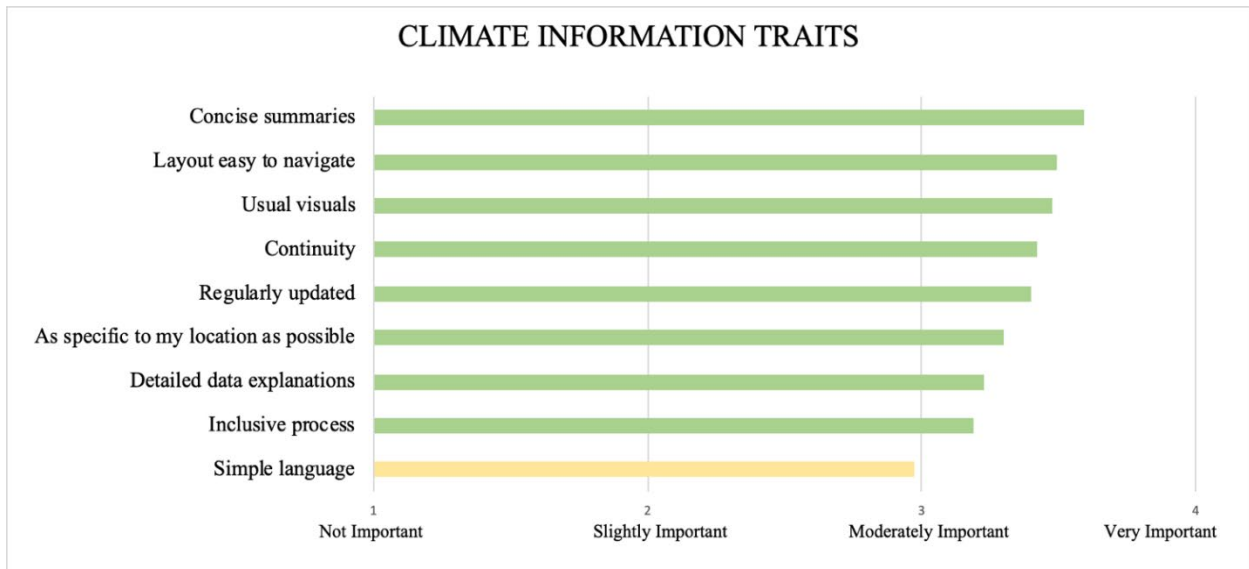
### 3.2 ClimAID Outputs

This section includes information on the qualities respondents value in a source of climate information and the types of outputs they find most useful. Recommendations for incorporating feedback into the ClimAID update are provided.

### 3.2.1 Traits of Climate Information

Respondents were asked to rank nine climate information traits based on their level of importance on a one-to-four scale from *not important* to *very important*. All but one trait averaged a score of three or higher, indicating that most traits are considered at least moderately important (Figure 8). The three traits identified as most important were *Concise summaries*, *Layout easy to navigate*, and *Useful visuals*. This order suggests that ease of use is of slightly higher priority than standardization of information, as traits including *Continuity* and *Regularly updated* received lower average scores. While *Simple language* and *Inclusive process* received the lowest average scores, they are the traits most directly relate to accessibility of information for the general public and procedural justice.

**Figure 8. Relative Level of Importance of Climate Information Traits on a Scale from One (Not Important) to Four (Very Important)**



Detailed data explanations and As specific to my location as possible ranked relatively low. However, feedback provided within other aspects of the survey and interviews suggests that downscaling and specificity are perceived as important for decision-making (see the Downscaling Data section for further details). Respondents were offered a write-in option to identify additional traits of importance. Perceived credibility emerged as a highly important climate information trait. Respondents described credibility as inclusive of scientific rigor established through peer-review processes as well as institutional legitimacy. Both NYSERDA and Columbia University were identified as examples of credible sources, among many others. As this needs assessment is affiliated with both institutions, it is possible that individuals who consider these institutions to be credible may have been more likely to respond to requests to participate in the study and to mention them by name, while those who do not may have declined to respond to the survey. However, these indications of stakeholder trust in institutions involved in ClimAID reflect positively on the ability of the assessment update to be meaningfully incorporated into decision-making processes.

“I’m looking for real modelling chops...how I identify that would be, you know, just people referencing also good studies, or if it’s coming out of Columbia and the underlying approach is peer reviewed, that kind of stuff.”

“It’s always great to go back and say ‘this is what NYSERDA is saying, this is what New York State is saying.’ It just lets us lean on that credibility.”

### 3.2.2 Written Outputs

The 2011 ClimAID report was released as a written document with a number of outputs including supplemental information, synthesis reports, sector chapters, and annexes. This section provides recommendations for the written outputs of the climate assessment update related to content and structure.

#### 3.2.2.1 Sector Reports

Respondents recommended adding the built environment as a sector in the ClimAID update. While the built environment intersects with multiple existing sectors—for example, transportation and energy—individuals familiar with ClimAID specified interest in a dedicated chapter related to buildings, construction, and design. Based on the significant number of participants listing the built environment as a primary sector of work, such a chapter would likely prove relevant to a wide audience. There are a range of questions, impacts, and recommendations mentioned by respondents focused on buildings, which may serve as a starting point

“Please add a chapter on impacts on buildings.”

for considerations of a sector chapter. There is interest in designing buildings for future climate impacts, incorporating climate information into building codes, exploring the relation between building energy efficiency and resilience; site-specific climate data; and planning for long-design lifetimes of public infrastructure.

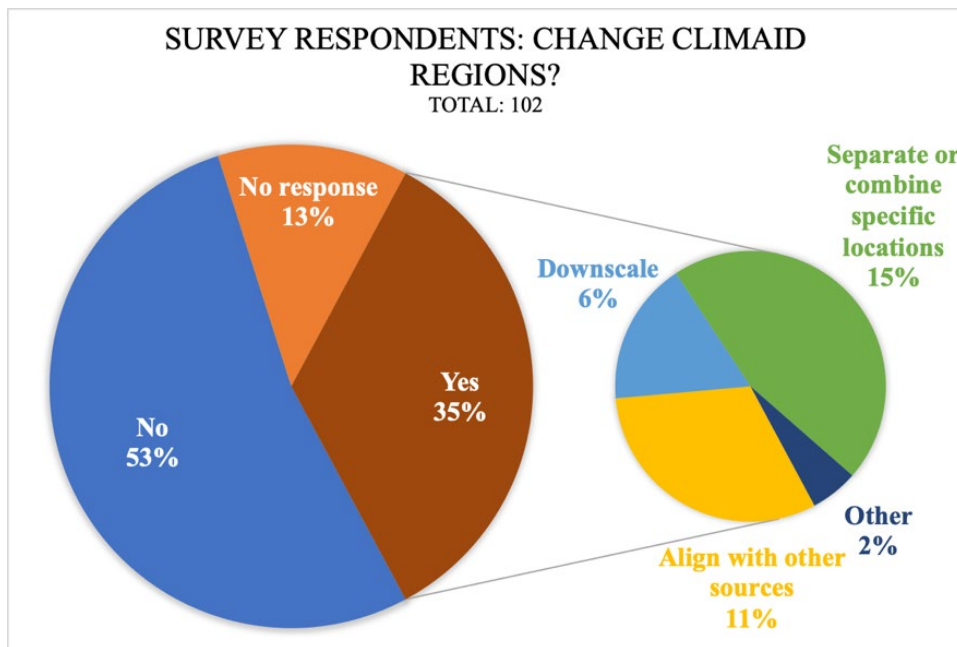
### **3.2.2.2 Regional Reports**

NYSERDA is considering the inclusion of regional reports as a written output for the assessment update. The original regions (Figure 9) were “grouped together based on a variety of factors, including type of climate and ecosystems, watersheds, and dominant types of agricultural and economic activities” (ClimAID 2011, p.17). This section provides respondent feedback on the current ClimAID regions and possible changes for consideration.

When asked if they would change the ClimAID regions from those used in the 2011 and 2014 reports, a slight majority (53%) of respondents said they would not change the regions, while 35% of respondents indicated that they would prefer a change (Figure 7). While no clear consensus emerged, three categories of recommendations were identified: downscaling the regions, separating or moving specific geographies to a different region, and aligning the regions with other sources. Respondents expressed that generally speaking, more granular regions would improve usability. Diverse examples of counties within the same region that respondents perceived to experience different climate impacts were provided, for example, Onodaga and Jefferson; Westchester and Saratoga; and Saratoga and Putnam. Many requests for moving a county or area from one region to another were specified (for a full list, see appendix C). A common recommendation involved separating New York City from Long Island. Respondents identified the urban heat island (UHI) as a factor contributing to New York City’s unique local climate. Another recurrent response was to separate the lower and upper Hudson Valley. A third set of recommendations involve aligning the regions with other established State breakdowns. The most common suggestion was to align the ClimAID regions with the Regional Economic Development Council’s (REDC) breakdown of areas (Figure 10).

**Figure 9. Percent of Survey Respondents Indicating whether They Would Change the ClimAID Regions (Left)**

For those who would change the regions, categories of the recommended change are shown (right).



**Figure 10. Current ClimAID Regions (NYSERDA 2011)**

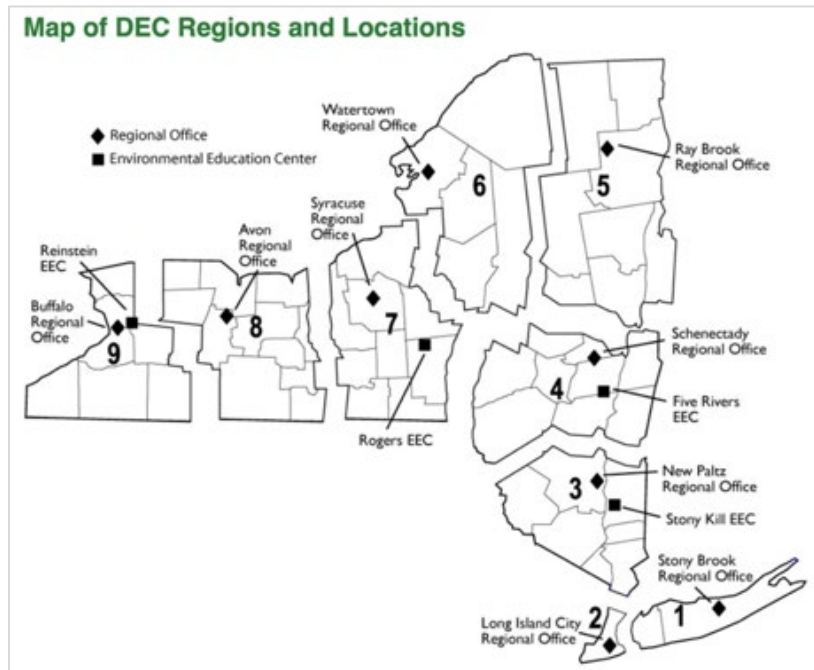




Figure 11. Regional Economic Council Regions (Empire State Development 2020)



Figure 12. Department of Environmental Conservation Regions (New York State Department of Environment Conservation 2020)



Multiple respondents, in addition to suggesting alignment with REDC regions, expressed surprise that they were not currently aligned. The ClimAID update may consider explaining the rationale for the regions in more detail, clarifying whether they are based on climatic or economic breakdowns, or a combination of the two. Other suggested alignments included Department of Environmental Conservation regions (Figure 12), USDA Plant Hardiness Zones, and Tourism Regions. Many of the suggested alignments are to regional breakdowns defined by political rather than climatic boundaries. Therefore, the recommendation to align with other sources may conflict with recommendations to align regions even more granularly based on climate impacts. Respondents indicated that aligning the ClimAID regions with other commonly used regions would streamline working across sectors and agencies. It is perhaps valuable to consider how this barrier may be addressed with other components of ClimAID.

### **3.2.2.3 Climate Curriculum**

In addition to the sector and regional reports, respondent feedback suggests interest in other types of written outputs to address specific user priorities. There is high interest in educational tools and curriculum related to climate change. Second only to the built environment, education was a frequently identified the “other” sector of work among survey respondents (Figure 3). There is a perceived gap in the integration of climate information into the New York State education system, which a state-level climate assessment has the potential to address. Specific recommendations included provision of climate lesson plans for a variety of grades, outreach, and collaboration with teachers as well as design of online learning materials. The interest in educational resources as a ClimAID output extended to a wide range of institution types. Based on these recommendations, NYSERDA may consider development of an output designed with and for educators.

“more educational tools for students—connecting ClimAID to school curriculum”

“climate change education in K-12, higher education, technical, Tribal, and informal”

“Why shouldn't a climate assessment have a lesson plan and have a set of materials for K through 12? Right now, if you had that, and you had been online, you could be giving it to the New York school system to do online learning right now. I mean they are grasping desperately for material. And so, when are you going to start educating the future leaders?”

“Please include climate education (and teacher preparation) in future updates...It's vital that children become climate literate as soon as possible and that we recognize climate impacts on our youth and the most vulnerable populations.”

### **3.2.2.4 ClimAID Summaries**

ClimAID summaries at varying levels of technicality and for various age groups were suggested. A ClimAID summary specifically for youth, for example, may align well with interest in educational materials for students. Summaries for policymakers and the general public were also specified, as well as releasing versions of ClimAID at multiple levels of technicality. Respondents expressed their desire for climate assessments, and ClimAID specifically, to contribute to popular, general, and informal education.

### **3.2.2.5 Fact Sheets and How-To Guides**

A final category of additional written outputs is fact sheets and how-to guides which provide applied, concise information for practitioners. Based on multiple respondent comments, one potential fact sheet is a “practitioner's glossary” that not only defines but contextualizes common climate terms and explains their use. An interviewee suggested that when thinking about scientific language, explanations are necessary even for terms that scientists may assume are common knowledge.

Another common gap which may benefit from a fact sheet or guide relates to funding. Multiple respondents requested information on how to identify and secure funding for mitigation and adaptation efforts, links to existing funding sources, and assistance with grant application processes. A factsheet on funding mechanisms, or a how-to guide on funding climate action, would be of value. Additional possibilities might include how to communicate climate issues to the public (see the Communicating Climate Information section) or a set of factsheets on “levers of change” available to varying jurisdictional levels (see Silos section).

“A separate document that is written for an audience of young people—ages 14-17.”

“make information more readily available, prepare fact sheets/summaries of work in policy-friendly language”

“Simple, easy to comprehend summaries to accompany the highly technical data presented. You could even release multiple versions of the report that are highly, moderately, and minimally technical so that readers could choose which version is best for them based on their interest and experience.”

“When you're talking about a 100-year storm, well nobody until very recently has ever really said what that was. If you said that to the average person you would think that this is only supposed to occur once in a hundred years...why is it occurring more? And so, some of those kinds of references without definition or explanation...people just have no idea what you're talking about.”

### 3.2.3 Online Outputs

While the 2011 and 2014 ClimAID reports were written outputs, NYSERDA is considering including online outputs as part of the ClimAID update. This section includes recommendations for online information to accompany the written components of the assessment.

“executive summaries, very short ‘why everyday NYers should care’ section for each.”

#### 3.2.3.1 Data Downloads

There is interest in greater access to the data included in and produced for ClimAID. The static nature of the written reports limits the ability to explore the data and potentially adapt it to specific needs. Open access data is of interest, as it potentially allows for more tailored, context-specific use. However, increased data access also presents challenges. Providing additional data requires adequate training for how to utilize such information. Some respondents indicated that they feel they already have access to too much data, which leads to confusion over what to prioritize or incorporate into decision-making.

“More data download less written report with static images. Think about interactive reports that allow users to interact with geographical and climate data in an online platform.”

“full array of models/RCPs, rather than just percentile values.”

“There's tons of numbers out there but not all numbers are good numbers. Getting good data is the hardest job.”

#### 3.2.3.2 Mapping

A common suggestion among participants is the inclusion of online mapping features, with a focus on interactivity. There is interest in climate information mapped with social and economic data that allows for vulnerability analysis and assessments related to environmental justice. Of particular interest is mapping of flooding and inundation within coastal zones. Maps and other visuals were identified as highly useful in communicating climate information—in some cases, more useful than numerical data.

### 3.2.3.3 Infographics and Charts

Access to downloadable versions of infographics and charts can contribute to the usability of ClimAID. There is interest in incorporating graphics into PowerPoint presentations and other formats. Providing a bank of downloadable charts to accompany the written materials would streamline the process of using ClimAID for a wide range of users. ClimAID may also consider developing PowerPoint presentations or slides for technical and non-technical audiences which could be used for communication and outreach.

## 3.3 Climate Projections

This section outlines information relevant to updating the climate projections for the forthcoming assessment. In the 2011 ClimAID report, quantitative projections were provided for each of the seven State regions for temperature, precipitation, sea level rise (SLR), and extreme events. Qualitative information was provided on heat indices, frozen precipitation, lightning, intense short duration precipitation, and storms (including hurricanes, northeasters, and associated wind events). General trends in respondent interest and use of projections are described, followed by variable-specific recommendations. The content in this section reflects participants' interests, and therefore does not necessarily reflect what is technically feasible from a modelling perspective. In cases where interests conflict with feasibility, it may be valuable to consider how these needs could be met through other means and to provide explanations of the limitations of projections that address specific user requests.

“put out a bunch of polished, nicely graphically designed figures, in PowerPoint format or pdf format, that you could take and stick in your own whatever you were doing—teaching, communication material, PowerPoint presentations....it’s a really good way to take something that’s pretty technical and only read by professionals and get it out to a wider audience.”

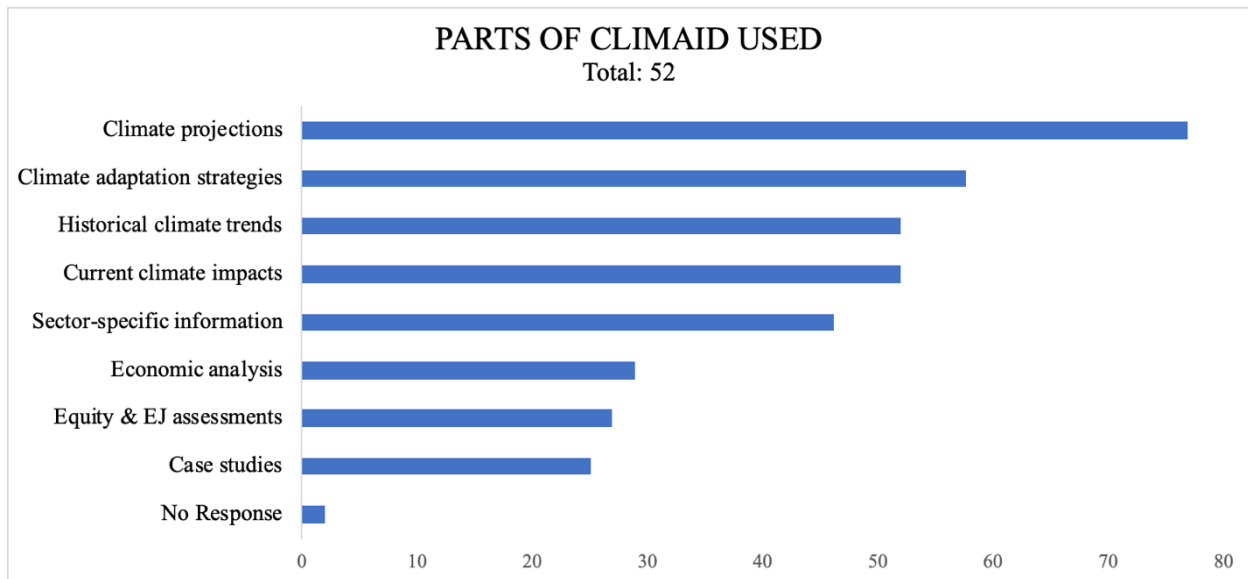
“I think a lot of academic graphs are often hard to comprehend, especially since unless it's in a PowerPoint they're generally so small in print that they're generally hard to decipher. So, I think good infographics leads to...what we call popular education, that I think communicates better.”

“In order to facilitate public understanding, greater use of visuals/graphics for data, trends and climate impacts should be expanded including the use of a variety of technologies.”

### 3.3.1 General Trends

Among study participants, climate projections were the most utilized component of prior ClimAID reports. Of those who were familiar with ClimAID, 77% had used the climate projections (Figure 13). It is therefore a high priority for new projections to meet user needs, should they be produced as part of the assessment update. Several trends emerged which highlight general priorities among climate users.

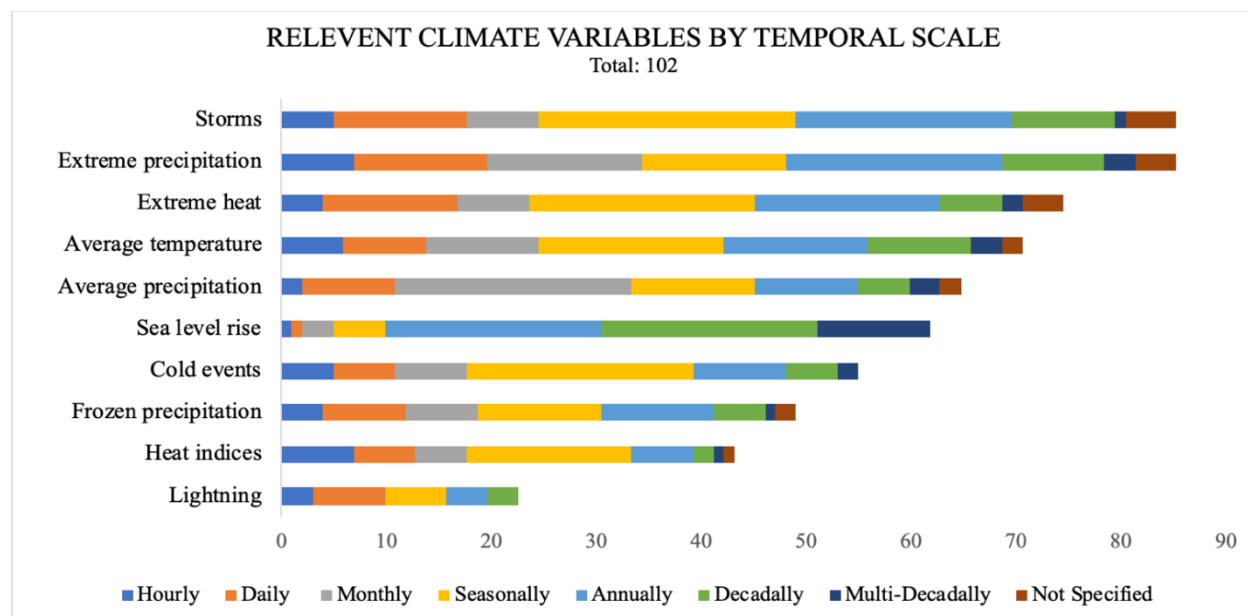
**Figure 13. Percent of Survey Respondents Who are Familiar with and Have Used ClimAID in Their Work**



It is important to note that no respondents suggested removing any of the current ClimAID variables; however, some variables were of higher priority than others. Participants tended to be more interested in changes in extremes and extreme events than in mean changes of climatic variables. The variables identified as most relevant to respondents' work were storms (85%), extreme precipitation (85%), and extreme heat (75%, Figure 14). By contrast, average temperature and average precipitation were relevant to 71% and 65% of respondents respectively. Interviews corroborated this finding—while changes in averages and extremes were both considered important, changes in extremes raised specific concerns regarding the crossing of thresholds in a range of systems from the human body to infrastructure. Uncertainty surrounding the frequency and intensity of extreme events also contributed to heightened interest.

**Figure 14. Percent of Respondents Indicating that Each Climate Variable Is Relevant to Their Work**

Disaggregated by the timescale of information preferred for each variable.



For each variable listed, respondents indicated the temporal scale most relevant to their work. While preferences differed by variable, information at seasonal and annual scales were most commonly specified. Interest in such short temporal scales suggests possible mismatches between the information that climate projections tend to provide and what climate users believe and indicate is relevant. Global climate models can project a range of possible changes over decadal to multidecadal timescales. Seasonal information, by contrast, is typically provided by weather forecasts. Some variables, however, do lend themselves to longer timescales—sea level rise projections were primarily relevant to respondents at annual to decadal scales. However, when asked about preferred time horizons of climate information generally rather than in relation to a specific variable, respondents' feedback differed from the timescales expressed above. There is more interest in projections for the next five to 10 years than there is in historical or current data. There is highest interest in data for 2030, with relatively less interest in 2050 and 2100 (Figure 15).

“all [timeframes are] important. I think the historic is less important than the future these days...because I think unfortunately what happened in the past is just not really all that relevant anymore because it's going to be so different in the future.”

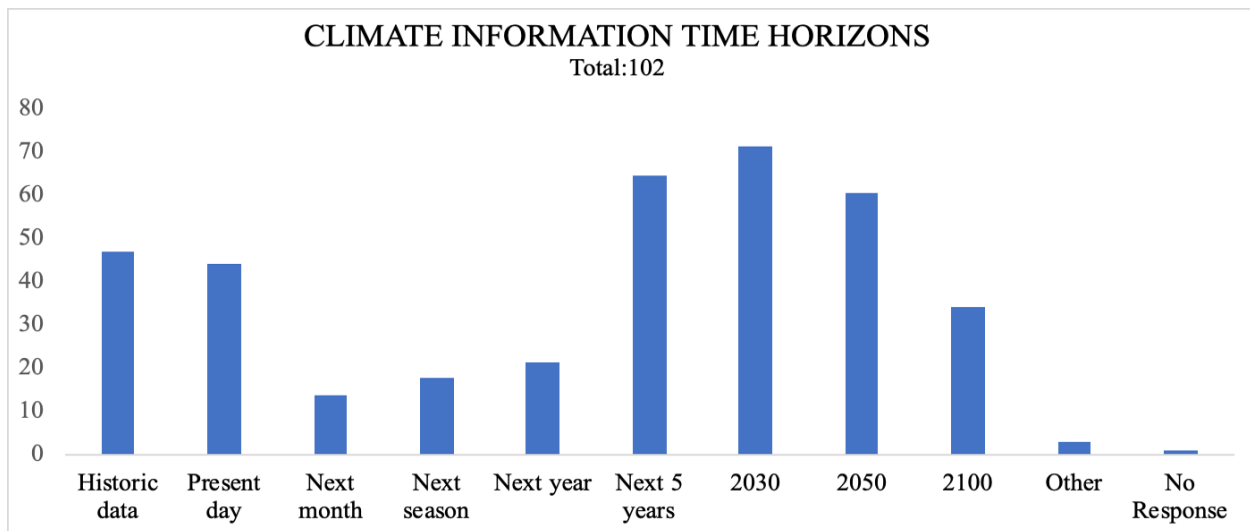
“The management plans that people are making are usually 5 to 10 years. They're not 50-year plans.”

“I think that doing the full [assessment] every 5 years would be great, I know that's really expensive, but at least the projections need to be updated every 5 years.”

Planning for the next 10 years therefore seems to be the priority for the majority of participants. This timeline aligns with a range of decision-making processes, including the United Nations Sustainable Development Goals for 2030; National Determined Contributions for the Paris Agreement communicated every five years; and more generally, municipal and natural resource planning which tends to outline goals on roughly similar timescales. However, on the scale of the next five to 10 years, projections may not substantively differ from the present and representative concentration pathways (RCPs) may not substantively diverge from each other (IPCC 2014). It is therefore important to include projections for longer timescales, even as shorter-term information may be desirable for planning purposes.

**Figure 15. Percent of Survey Respondents Indicating the Time Horizons Relevant to Their Work**

Respondents can select multiple time horizons.

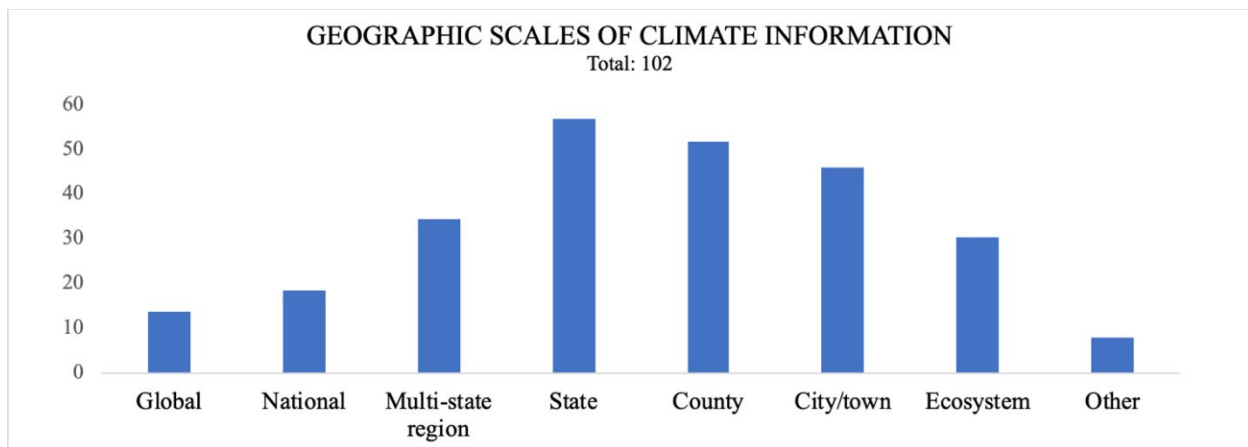


In terms of the geographic scale for climate information, respondents expressed most interest in data at the State level (57%, Figure 16). In general, there is greater interest in more localized spatial scales (State, county, city/town) than at higher scales (national and global). The State and sub-state regional projections produced in prior ClimAID reports closely match the spatial scales of interest for respondents.



**Figure 16. Geographic Scales of Climate Information Most Relevant to Respondents' Work**

Percentage of total survey respondents.



### 3.3.2 Variables

This section will discuss respondents' interest in variables and indicators for consideration in the climate projections update.

#### 3.3.2.1 Temperature

Respondents indicated that heat-related events are more relevant to their work than cold events. Projections for cold events were the least utilized climatic variable included in the previous ClimAID reports. However, there is particular interest in changes in cold events within the agriculture and ecosystem sectors related to changes in snowpack, implications for water resource management, and crop yields. Extreme temperature changes were indicated as higher priority than average changes. In the 2011 and 2014 ClimAID Reports, extreme temperatures were defined by the following:

- Individual days with maximum temperatures at or above 90°F
- Individual days with maximum temperatures at or above 95°F
- Heat waves, defined as three consecutive days with maximum temperatures above 90°F
- Individual days with minimum temperatures at or below 32°F
- Individual days with minimum temperatures at or below 0°F

Respondents identified multiple temperature thresholds and indicators of interest, which generally align with those used in prior ClimAID reports. However, there is interest in an even higher temperature indicator for 100-degree days, which was identified as relevant to material integrity. For various built systems, including pavement, aviation, and rail, there are structural impacts which occur above 95°F. Additionally, there is interest in temperature projections specifically for New York City due to the urban heat island (UHI).

**Table 1. Responses Regarding Temperature**

| <b>Indicator</b>   | <b>References</b>  | <b>Context</b>   |
|--|--|--|
| Individual days with minimum temperatures at or below 32°F               | “the biggest one obviously for the freezing side of the house is freezing temperatures, getting below freezing for a prolonged period of time.”  | Transportation, pavement design  |
| Three consecutive days with maximum temperatures above 90°F              | “I believe that the Department of Health sites extreme heat at 2 to 3 consistent days over 90 or over 92?”   | Public health, heat related illness, aligning with DOH   |
| Seven consecutive days of high heat                                      | “We actually look at the high temperature over a given week.”  | Transportation, rail, and pavement integrity   |
| One hundred-degree days and over   | <p>“above 100 or so it starts to really affect the ability to have the material be stable.”</p> <p>We’ve never had a 100-degree day. So, when we see projections that say by 2050 we’re going to have ‘X’ number of 100-degree days, that’s at least historically a pretty useful thing to say to people.”</p> <p>“more extreme days, like 100, 105, 110...are actually relevant for material integrity as you might imagine. So, pavements and other...heat sensitive elements. And it’s also operationally relevant at our aviation facilities. It changes aviation lift, so in other words, more runway may be needed for fully loaded take offs at some point in the future on those extremely hot days...so the 90° threshold...makes a whole lot of sense for human health and welfare but it is not particularly indicative of equipment or materials failure for us so we actually like hotter days to be in the projections.”</p> | <p>Transportation, pavement design</p> <p>County government, environmental communication</p> <p>Transportation, aviation, pavement, and material integrity</p> |
| Temperature swings (difference between maximum and minimum temperatures) | <p>“There’s a body of literature showing that the minimum temperature and how quickly the surfaces cool down in the night and how much of a difference there is between the max[imum] and the min[imum] probably affect human bodies more [than heat index] in terms of how they adapt.”</p> <p>“The duration is critical when you’re looking at how that impacts or potentially could lead to extended power outages or equipment failures. So, if you go from an extreme high to an extreme low that also plays into that.”</p>  | <p>Public health, heat related illness</p> <p>Telecommunications, equipment failures, and power outages</p>  |
| Maximum summer temperature   | “I think that maximum summer temperatures...you know those high degree temperatures are going to be...super relevant to us.”   | County government, environmental planning  |

### 3.3.2.2 Precipitation

There is significant interest in projections for extreme precipitation events across a wide range of sectors, with a focus on intense short duration events. There is a perception among respondents that precipitation changes are less “manageable” than temperature changes. Unsurprisingly, the water sector is particularly invested in precipitation projections and intensity-duration-frequency (IDF) curves to inform stormwater management and design guidelines. In the 2011 ClimAID report, only qualitative projections were provided for brief intense rain events, reflective of the high uncertainty and variability inherent in projecting precipitation changes. While quantitative precipitation data was generally preferred among respondents, in the absence of such data, more detailed qualitative descriptions would also be valuable. Respondents had varying views on the need for more downscaled information, yet suggested that when detailed data is not available, qualitative information can provide useful context for decision-making (see Downscaling Data section).

“Temperature change, there are lots of people who have looked at it. We've looked at it, you've looked at it. And that is something that is manageable, if you will. It is the other unknowns about changes in wind speed, changes in solar insolation, precipitation—those have big impacts.”

**Table 2. Responses Regarding Precipitation**

| Indicator   | References  | Context                             |
|-------------|---|-------------------------------------|
| IDF curves  | “we use historical IDF curves to look at intensity, duration, and frequency statistics for precipitation...we were very much, for a long time have been wanting basically forward-looking statistics for the return period for these extreme rain events to the extent that those can be produced.” | Water sector, stormwater management |
| Snowfall    | “snowfall rates and snowfall amounts. That would be very useful. It would also be useful to know icing events, from the standpoint of the snow maintenance.”  | Transportation, highway maintenance |
| Cloudbursts | “we design our drainage systems for like a 5-year 1-hour event and with a peak intensity of like 6 inches an hour which is a really, really intense cloudburst.”  | Water sector, drainage design       |

### 3.3.2.3 Sea Level Rise

Respondents generally indicated that existing sea level rise data and projections are accessible and fit for use. One participant from the water sector stated that sea level rise is “one of the areas we seem to have the most faith in the overall trend and for us it's more of a technical challenge of how do we adapt our systems.” The feedback and requests for sea level rise projections are therefore less related to fundamental data gaps and instead reflect interest in utilizing sea level rise projections in decision-making

and adaptation implementation. There is interest in sea level rise projections for each decade out to 2100, rather than solely for 2020, 2050, and 2080 as was presented in prior ClimAID reports. Another commonly mentioned gap is the visualization and mapping of sea level rise projections onto the landscape. Multiple participants explained that projections without accompanying maps are less useful, particularly for the purposes of risk assessment and communicating climate information to the public. However, mapping becomes a repetitive exercise as sea level rise projections are updated and existing maps become obsolete. A participant from the coastal sector recommended standardizing the sea level rise depths (i.e., 1 ft, 3 ft and 6 ft) rather than the year (i.e., 2020, 2050, 2080) within projections.

By doing so, the maps would remain the same and the year in which that level of rise is expected could instead be adjusted. Prior ClimAID sea level rise projections included a “rapid ice-melt scenario” that accounts for accelerated rates of ice melt in Greenland and Antarctica. Respondents indicated interest in this scenario, with the caveat that planning and designing to such a standard may not be possible.

“the state projections have these years, and because they’ve selected a year that’s a nice round number then the projected rise winds up being like 1.27 [feet] or something...then the next year they come out with a new projection and now its 1.38 [feet] and now your maps are totally useless.”

“it may be very expensive to try and deal with the worst-case sea level rise. I'm sure it is if you're assuming that Greenland ice cap is melting. I don't think we're going to be able to design for that.”

**Table 3. Responses Regarding Sea Level Rise**

| Indicator   | References  | Context   |
|---|---|---|
| Sea level rise past 2100                            | “with regards to sea level rise we would probably look to go a little bit farther out especially for our drainage systems, you know, I think we might want to start looking at 2100 and beyond but given the uncertainty for some of those projections I think that’s why we tend to come back to like 2050s as a starting point just because once you start going out beyond that the projections can get almost too extreme for us to understand how we can handle them.” | Water sector, flood management  |
| Sea level rise with reference baseline              | “Any sea level rise projection figures should always include a reference baseline. For example, page 125 of the ClimAID report does not include a reference baseline.”  | Transportation, flood management  |
| Sea level rise by decade                            | “we always have a problem with the temporal scale at which the ClimAID and NPCC data is delivered, sort of the 30-year plateaus...So for me, understanding the general progression of the projections in decadal times steps is important. 30 years is just too broad a time period to have a single number associated with it in my opinion.”<br><br>“Sea level change projections by decade.”<br><br>“Probabilistic sea level rise by decade”                             | Transportation, risk management<br><br>Water resources, engineering guidelines<br><br>Transportation, regional planning |
| Access to underlying sea level rise projection data | “if we could get the individual [NPCC] sea level rise projections, I think we are savvy enough to work through those. So, as I understand it you should probably have at least...24 sea level rise projections x 2: one for RCP4.5 and one for 8.5. So if we could get all of those honestly then I think that that would be better for our risk management purposes than just having the kind of fully processed projections by percentile.”                               | Transportation, risk management   |
| Sea level rise projection visualizations            | “I think visuals are very helpful. I mean as a perfect example we talk about sea level rise but what does one foot of sea-level rise really mean for your community? What does it look like?”   | Coastal zone, environmental communication   |

### **3.3.2.4 Heat Indices**

Heat indices were discussed most frequently in the context of public health. In terms of indicators, there is interest in aligning ClimAID projections with existing sources like the National Weather Service to encourage consistency in policy and research. The lack of humidity projections and heat/humidity data were noted as a gap by respondents.

**Table 4. Responses Regarding Heat Indices**

| Indicator                             | References  | Context                             |
|---------------------------------------|---|-------------------------------------|
| Heat Index (National Weather Service) | "Because we work very closely with the National Weather Service, they use heat index for the warnings and that's more reflective of what temperatures affect the human body. So I think that's one that we favor in terms of research." | Public health, heat related illness |
| Humidity                              | "Humidity projections are really rare so that will be very helpful."  | Energy, engineering                 |
|                                       | "Average temperatures/relative humidities, high and low temperatures / relative humidities"   | Energy, local government            |

**3.3.2.5 Storms: Hurricanes, Northeasters, and Associated Wind Events**

According to the original ClimAID report, the types of storms with the largest impact on coastal areas of New York State are tropical cyclones and northeasters. Storms are a high priority and a significant concern among participants, with many evoking Hurricane Sandy as the archetypal destructive storm and a turning point in climate risk planning for the State. As such, recommendations related to storm projections included utilizing Sandy as a reference point for future storms, possibly through qualitative descriptions of "Sandy-like" events. There was interest in what one respondent referred to as "coincident events" in which a storm is compounded by additional climate impacts. While it was acknowledged that quantitative projections may not be possible for such combinations of events, there is interest in learning more about the associated risks. This is another case in which qualitative descriptions may provide useful context in the absence of projections.

**Table 5. Responses Regarding Storms**

| <b>Indicator</b>        | <b>References</b>  | <b>Context</b>   |
|-------------------------|--|--|
| Five hundred-year storm | “for a new asset we have to design for at least a 500-year interval, plus a margin, and that could be very costly and it's really, it's kind of become the normal way of designing.”   | Energy, asset/facility design  |
| Twenty-five-year storm  | “In terms of flooding numbers, 10, 50, and 100-year storms are the most commonly used so, maybe your 25 [year storm] to fill in the gap.”  | Transportation, pavement design  |
| Polar vortex            | “I was kind of assuming that polar vortexes were related to climate change but I'm really not sure about that...well, it's definitely a threat to our assets.”   | Energy, electricity generation   |
| Wind events             | “You know for wind events it's like what was the peak wind over 4 hours or whatever right? And how many of those events happened across a particular year?”  | County government, emergency management                                      |
| “Sandy-like” events     | “The 2011 ClimAID report was published before some major flooding events, in particular Hurricane Sandy (October 2012). Flooding depths and extent of this event should be utilized as a reference as it has been and will in all likelihood continue to be a major catalyst for resiliency action for coastal areas including heeding evacuation orders.”   | Transportation, emergency management, communication, and resilience planning |
| Coincident events       | “better understanding of what I guess I would call ‘coincident events.’ So, incidences where you might have storm surge followed by extreme rainfall...if we get a hundred year surge in a future year, is there any expectation that that's accompanied by, let's say, the 10-year rainfall event? I think that's probably not supported by the science at this point but it's an interest in our community.” | Transportation, perimeter design for critical facilities                     |

### **3.3.2.6 Additional Variables**

Beyond the indicators specifically covered in the survey and included in prior ClimAID reports, respondents indicated additional areas of interest relevant to climate projections. Some of the following recommendations include climate-related impact indicators, which may fall outside the scope of the ClimAID climate projections. However, the areas of interest in the table below are useful to understanding the priorities of climate information users across the State and potentially incorporating information into sector chapters in cases where it cannot be adequately covered by projections.

**Table 6. Responses Regarding Other Variables**

| Area of Interest | References   | Context  |
|------------------|--|--|
| Drought          | <p>“I feel like flooding gets the most attention. And maybe this summer we’re going to have a drought, who knows. Maybe that will be something new we have to deal with.”</p> <p>“we are somewhat complacent that we will be water rich and there is a kind of lack of information about future droughts so...if we did have better information about future droughts we could certainly plan for that as well. Right now, we do rely on historical observations and historical drought records like from the 1960s.”</p>  | <p>Water sector, resilience planning</p> <p>Water sector, water resource management</p>  |
| Great Lakes      | <p>“we do have good data that can map flooding projections. It’s not as good around rivers or the Great Lakes. So better mapping of projected flood zones in the non-coastal area would be really useful. I think that’s a big gap.”</p> <p>“greater consideration given to Great Lakes water levels/ice cover projections”</p> <p>“updated coastal erosion hazards for Great Lakes shorelines”</p> <p>“Since 2011, the Great Lakes area has experienced multiple flooding events underscoring the need to investigate impacts, and project future conditions that also includes contributing precipitation from out-of-state and wind driven coastal flooding.”</p> | <p>Coastal zone, flood risk management</p> <p>Coastal zones, coastal resource management</p> <p>Water resources, ecological conservation</p> <p>Transportation, coastal management</p> |
| Land degradation | <p>“projected climate impacts to agricultural land productivity”</p> <p>“shoreline erosion rates; wetland migration/degradation”</p>   | <p>Resilience planning</p> <p>Coastal zone management</p>  |
| Seasonal changes | <p>“the length of seasons and timing of seasonal changes and how that impacts wildlife cycles.”</p> <p>“There’s some neat data in a few places on ice out, and how that is sort of a trend that is starting to show. Like wow, look at the changes on what we’re seeing for when ice out tends to occur, when freeze over occurs, how frequent and how long-lasting full ice cover lasts on water bodies.”</p>   | <p>Ecosystems, natural resource management</p> <p>Ecosystems, aquatic resource management</p>  |
| Air quality      | <p>“air pollution change projections, ambient CO<sub>2</sub> change projections”</p> <p>“detailed maps of projected ozone, fine particles (PM<sub>2.5</sub>), regional methane levels”</p>   | <p>Energy</p> <p>Air pollution research</p>  |



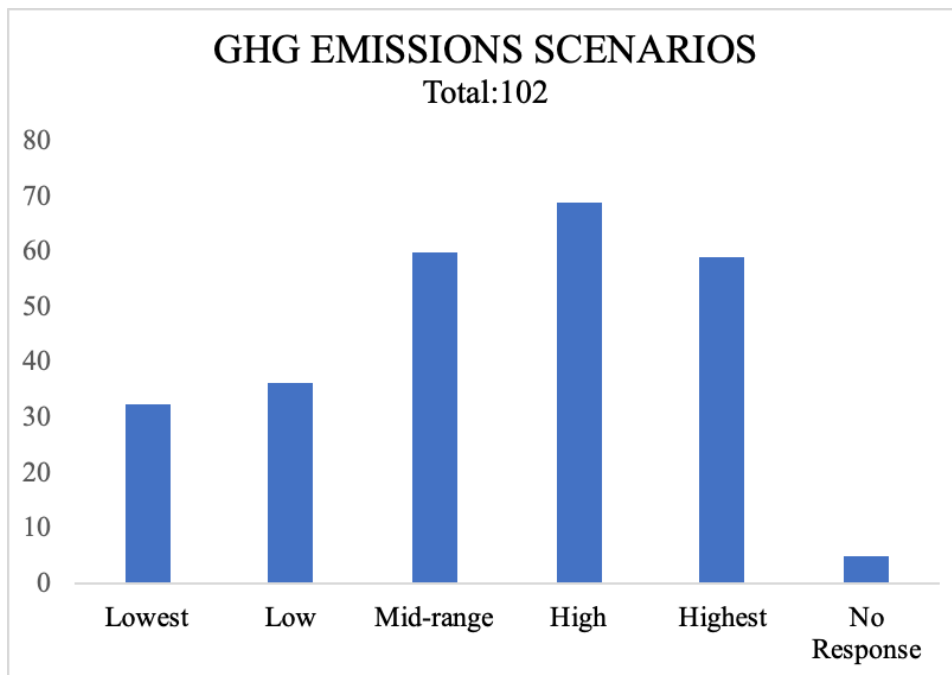
### 3.3.3 Emission Scenarios

High emission scenarios were determined to be the most relevant to respondents' work (67%), followed by mid-range scenarios (60%, Figure 17). There is less interest in the lower end of emission scenarios, which are generally considered to be unrealistically optimistic. One respondent indicated that the lowest scenarios are "useless" as society has likely already overshoot such an outcome. The suggestion was to include a selection of emission scenarios reflecting the most likely outcomes rather than including a low scenario for the sake of demonstrating the "best case" outcome.

"The low range scenarios are not useful at all...They are not even a good projection of what we think is happening...and keeping it in the mix is very confusing for people. It creates a real communication issue. You know I think if 90% of scientists think we're on the high end of the range, stop showing the low end of the range."

**Figure 17. Percent of Survey Respondents Indicating that Each Emission Scenario is Relevant to Their Work**

Respondents can select multiple options.



There is a sense that the higher-end scenarios are more realistic and therefore should be used in planning. While there is desire to prepare for the “worst case scenario,” such planning is necessarily more expensive—and in some circumstances, economically prohibitive. There seems to be higher expectations placed on the quality of the high-end compared to low-end scenarios, with respondents indicating that they must be confident the “worst case scenarios” are done well in order to use them in planning. Many respondents indicated that they are currently using mid-range scenarios in decision-making, although some specify that 90th percentile projections are used. For this reason, it is particularly important that the mid-range scenarios are both realistic and thoroughly explained in the assessment.

While respondents do not typically use the highest emission scenarios in decision-making, there is general interest in understanding what high-emission futures are possible. This interest lends itself to the inclusion of a potentially even higher-end scenario in the ClimAID update if it is determined that a Representative Concentration Pathway (RCP) above RCP 8.5 is possible and/or likely based on the current trajectory of emissions.

### 3.4 Research Gaps

NYSERDA’s organizational chart for the next ClimAID assessment specifies a category of “research gap-fillers” to address specific needs. A number of gaps were identified throughout this needs assessment, some related to scientific knowledge gaps and others related to institutional barriers. Each topic area is complex and requires additional research and engagement beyond the scope of this assessment. This list therefore serves as a starting point for considering the needs highlighted by participants.

“I think the high-end scenarios are very important. I mean all the scenarios are important, but I think it’s important that those are done well and also that we can communicate what they mean because really, I think as a government we have to prepare for the worst, right?”

“It’s nice to see a scale, so you can actually see the possible variation that exists. Mid-range is the most common mainly from the standpoint of you need to pick something and the high end can get very economically unfeasible very quickly.”

“We almost always focus on the middle, which again might be a product of the way the information is presented by the NPCC. So, we take the 50th percentile of the projections. Actually, in some cases we take the 90th... for the near-term, meaning about 2050s, we’ve been using 90th and I think as we go further out we probably tend more towards the middle.”

“There is definitely room for a more extreme tail end scenario right now.”

**Table 7. Responses Regarding Research Gaps**

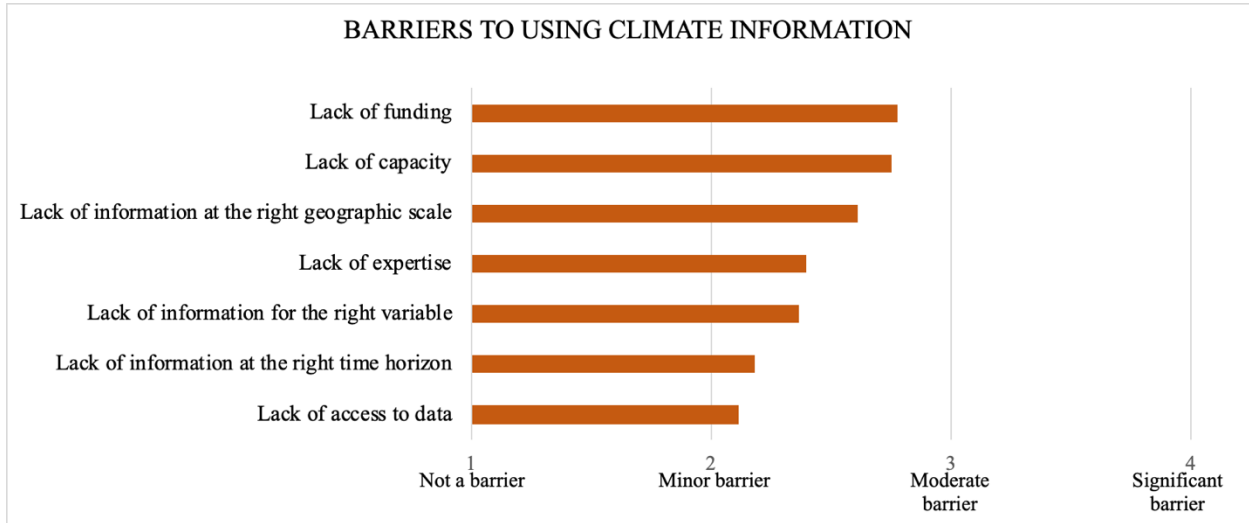
| <b>Gap</b>                                    | <b>Reference</b>   | <b>Context</b>   |
|---|--|--|
| Ecosystem monitoring for environmental change | “Very much would like to see a more comprehensive assessment of the lakes and rivers across the Adirondacks. It was done in the mid 80’s in like 1,400 lakes...wouldn’t it be great, if there was funding, to redo that with modern technology, measure a few new things...and really start to see what’s working, what’s not working.”  | Ecosystems, natural resource management  |
| Planning for a winter-peaking electric system | “What we do see as we look out down the road is that electrification will likely lead New York to be a winter-peaking electric system. And we just historically [have] always been summer peaking. And that has some pretty significant ramifications for what the fleet of resources would look like and how we’ll need them to perform.”   | Energy, electricity generation   |
| Vector-borne disease                          | “allow more focus on...things like infectious diseases and how weather comes into play in terms of Lyme disease and West Nile Virus.”  | Public health, virus transmission  |
| Disaggregated social and economic data        | “How, for example, wind effects would affect one population versus another or flood events—you know who’s in a flood plain—if that data exists I’m not aware of it, right? Like I’ve seen it done at other scales but at my county level, at a scale I could use, I don’t have a sense of who is in the floodplain as an equity lens.”   | County government, environmental planning  |
| Heat-health adaptation                        | “we don’t have any data on indoor air temperatures, any data on energy consumption that could be used as proxy for what mitigation strategies people have in their homes and workplaces. I think that could be interesting to look at.”  | Public health, temperature data  |
| Climate migration                             | “inventory of areas where sea level rise is expected to make areas unusable.”<br><br>“we’ve seen the press and we’ve seen from some academics and leaders is discussion of how western New York will be a climate oasis and how the big issue for us is preparing for an influx of climate refugees. And I think that’s a very confusing message and there’s a lot of uncertainty whether that’s the case.”<br><br>“projects that account for likely population migration, how climate refugees from other areas are likely to impact NYS (how can we better prepared to accept this groups?)” | State government, housing planning<br><br>County government, demographic impacts<br><br>Public health, receiving communities |

While there are areas, such as those described above, lacking scientific data and information, many respondents indicated that access to data was not a primary concern. When asked to rank specific barriers to utilizing climate information, *Access to data* was the least significant barrier (Figure 18). In fact, all three barriers with the lowest scores related to data access. *Lack of information at the right geographic scale* ranked slightly higher, in line with the general interest in downscaling. *Lack of funding* and *lack of capacity* were identified as the two most significant barriers. Respondents were also provided the option to write in additional barriers, and 100% of the written responses related to capacity rather than data needs. According to one respondent, “It’s not lack of access, it’s lack of application, funding, time, and capacity. We would need access to people who could assist us.” Interviewees confirmed this trend,

repeatedly stating that they typically have the data they need or are able to obtain it when requested. Participants suggested that the research-gap fillers include research on overcoming institutional barriers to better meet the needs of climate information users across the State, which includes reducing barriers to data access relating to politically controversial information.

**Figure 18. Relative Severity of Barriers to Using Climate Information**

Ranked on a scale from one (not a barrier) to four (significant barrier).



**Table 8. Responses Regarding Barriers to Information Use**

| Gap                            | References   | Context  |
|--------------------------------|--|--|
| Funding adaptation planning    | “Funding for planning and implementation without cost share. After COVID, I doubt any muni[cipalities] will have planning funding.”  | Local government, climate resiliency planning  |
| Legislative roadblocks         | “both the tidal and freshwater wetlands maps need updating. There have been proposals in legislation and budget in past years and [the] can keeps getting kicked down the road. We are still using tidal wetlands regulatory maps, I’m not even joking you, they are from 1974.”   | Coastal zones, budgets for mapping   |
| Siloed infrastructure planning | <p>“I’ve found dam removal to be one of those areas where I don’t think the agencies are on the same page.”</p> <p>“Right now, we’re doing a project looking at all the county and town roads where they cross streams... but then we might have a State crossing in the middle. So, we can be working with the towns to address these issues, for hydrologic considerations and aquatic organisms, but there’s still the State kind of in the mix.”</p> | <p>Water sector, infrastructure planning, hazard mitigation</p> <p>County government, transportation, environmental planning</p> |

### 3.5 Case Studies

There is high demand for case studies as both a communication and decision-making support tool. Interest is predominantly in cases that highlight adaptation implementation, in contrast to vulnerability assessments or planning, which were a focus in the 2011 ClimAID report. The original ClimAID included a guidebook, “provid[ing] a stakeholder guide to climate change adaptation, including a series of steps that can help to guide the process of considering how to assess vulnerabilities and establish adaptation plans within an organization,” (ClimAID 2011, p.12)—a much-needed resource at the time of publication. However, in recent years there has been a proliferation of adaptation planning, yet relatively little progress in implementation (Bierbaum et al. 2012, NCA 2018). While aspects of adaptation actions will be context-specific, there is interest in highlighting the replicable methods and lessons learned.

Case studies are also needed at multiple jurisdictional levels to accommodate the differing responsibilities of various scales of government. Respondents tended to strongly identify with their jurisdiction type (e.g., county level government), perceiving adaptation planning and action as unique and potentially not comparable to efforts at other scales of government. Participants highlighted multiple cases of division of powers which impact environmental decision-making—for example, a county may be the dominant social service provider, while having little authority over energy code or land use. A town may have jurisdiction over certain transportation infrastructure, but not be responsible for emergency planning.

Differences in institutional responsibilities result in divergent adaptation strategies available to various jurisdiction types, which should be reflected in the case studies identified. Case studies could include, but are not limited to, State, tribal nation, county, city, town, ecosystem, and neighborhood scales. It may also be valuable to include a case study covering

“I think a good case study lets you understand the how and why of why an event has taken place, where, who's involved, [and] how the situation was resolved. So, the methods used to resolve the situation I think are very important to serve as a model.”

“We [as a county] don’t have a lot of levers that a city or a village or a town has. In New York State, we don’t have any land use authority to speak of. Energy code isn’t something that we have direct authority over except for our own facilities. We don’t deal with flood setbacks...So, what counties do is they’re the dominant social service provider for most communities...So, if we’re going to deal with health impacts, like vector-borne disease or thermal vulnerability, that’s going to fall right on us. We’re also very essential for coordination of emergency planning and response, so that’s another thing that makes us a really essential role in resilience planning.”

what individuals can do to adapt to the impacts of climate change. Cases should specify the “levers and tools” applicable to that scale of governance and describe concrete implementation actions that have been taken.

### 3.6 Economic Impacts

Respondents discussed economic considerations within climate adaptation planning and implementation that may be pertinent to the ClimAID update. As mentioned in the Regional Reports section, there is some interest in aligning the ClimAID regions with New York State’s Regional Economic Development Councils (REDC). Regardless of whether this recommendation is pursued, the interest among respondents in the REDC regions suggests that collaboration with the councils presents an opportunity to align ClimAID with economic development efforts in New York State more generally.

“They’ll only believe dollars.”

“Cost savings realized by considering climate change impacts in the regular maintenance/updating/renewal schedule of existing infrastructure and by planning for new infrastructure to avoid expensive upgrades later.”

“funding opportunities aimed at planning and adaptation would be a helpful resource.”

Lack of funding was identified as the most significant barrier to using climate information among respondents (Figure 18). Research on novel funding mechanisms, case studies related to securing funding, resources on existing funding sources, and grant application assistance are a suite of options ClimAID may explore in more depth to better support communities. Directly related to economic impacts of climate change, respondents are interested in both the costs of adaptation as well as the costs of inaction. There is a perception that making the economic case for climate action is the most effective strategy for garnering support, but that the information to make such a case is not necessarily available. Due to the high-upfront costs of climate adaptation, there is a need to better assess the costs of inaction and capture nonmonetary benefits to encourage long-term climate and resilience planning.

The inequitable distribution of economic resources and climate impacts in New York State is of particular concern. Respondents identified data gaps hindering the assessment of environmental injustice at the local scale, particularly related to the disaggregation of social and economic data. Any economic impacted work pursued in relation to ClimAID should therefore prioritize the economic impacts on vulnerable communities, with an explicit focus on addressing underlying causes of disparities in risk. Refer to the Environmental Justice section for further details.

## 3.7 Stakeholder Engagement

In addition to this needs assessment, participation in the ClimAID update process is necessary during production and after publication to ensure the salience and quality of the assessment. Given histories of injustice that have led to inequitable distribution of climate risk, it is critical that participatory processes center vulnerable, frontline, and communities of black, Indigenous, and people of color (BIPOC) that have historically been excluded from the production of climate information despite the disproportionate impacts of climate change on their lives. As noted in the Respondent Demographics section, there are communities and perspectives which are not represented—or are not adequately represented—in this needs assessment which will necessarily impact the recommendations for engagement which follow. Engaging with tribal governments and community-based organizations may be an initial action to correct this bias by gathering additional recommendations not captured here.

### 3.7.1 During Production

Many specific organizations which should be included or consulted throughout the ClimAID process were mentioned by participants; a full list can be found in appendix C. In other cases, more general recommendations were provided regarding professions (i.e., floodplain administrators), or organization types (i.e., local highway agencies) to be engaged. There are consistent suggestions across respondents that ClimAID collaborate with tribal governments, school systems, and regional planning councils in their assessment efforts. The range of organizations identified indicate that NYSERDA may benefit from considering groups and individuals outside of academia to be included as sector experts and chapter authors for the ClimAID update.

“being located in New York City, we tend to focus mostly on the products from the New York City Panel on Climate Change and since the projections, as far as I understand it, are consistent [with ClimAID] and that is done purposefully, our go-to is the New York City Panel on Climate Change Reports.”

There are multiple climate assessments at varying geographic scales with coverage of New York State, including the IPCC (international), the National Climate Assessment (national), and the New York City Panel on Climate Change (city). While there are benefits to having diverse sources with context-specific information, it is also useful to avoid contradictions between sources that can hinder decision-making. A significant number of respondents from the New York City area and beyond identified the New York City Panel on Climate Change (NPCC) as an important—and in some cases, primary—source of climate

information. Engaging with the NPCC process may increase awareness and use of ClimAID in New York City, while simultaneously improving the internal consistency across both assessments to better align city and State action.

### 3.7.2 After Publication

Once the ClimAID update is completed, there are multiple ways to engage existing and new audiences to ensure the report is accessible to users. Respondents are interested in community workshops or similarly structured events in which different audiences can engage directly with experts and authors about the content of the assessment. One interviewee highlighted that even for initiatives with relatively high-name recognition in government or environmental circles, such as PlaNYC in New York City, direct engagement is necessary for information to reach the general public. Another compatible option is to host training programs to develop competency with the ClimAID report among trusted stewards of information in different regions. These stewards can then share ClimAID resources in locally relevant ways with the public. Community-based and boundary organizations may be particularly well-suited for this type of engagement.

“I would like to see them [NYSERDA & State Agencies] going to localities and giving that information...amazingly, as well-known as I thought PlaNYC was, my own community board...half of those people who are community leaders had never heard of PlaNYC. And yeah, Bloomberg was doing that for what, 13 years, 12 years? So really it isn't out in a substantive way. Have people heard the words climate change? Yes. But do they really understand what that means? No.

And...government's not really making an effort to do that. And maybe it's a lack of capacity, it might be a lack of imagination, a lack of priority that regular people are a priority.”

“I'd suggest having regional discussions when you roll out the new report and allow groups to ask questions of experts who can assist them in determining how to move forward using the report and the data.”



## 4 Integrating Themes

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### 4.1 Communicating Climate Information

A major use of ClimAID has been as a tool for agencies, boundary organizations, and academics to communicate with their respective audiences or to the public. Many of the recommendations offered by respondents relate to tailoring ClimAID to be as effective of a communication tool as possible.

One such suggestion is to organize the information presented in ClimAID in ways that optimize its use for decision-making. Respondents expressed mismatches in the way that climate information is communicated in assessments and the way that policymakers would ideally like to see the information presented. One interviewee gave the example that a 50-year storm is less meaningful than specifying what size culvert is needed. Given that ClimAID is intended for a wide range of audiences, it is difficult and potentially limiting to tailor the content too narrowly to a particular group. However, it may be possible to develop fact sheets or how-to guides to assist in the translation of ClimAID for particular purposes. For many respondents who use climate information, a goal is to incorporate the information directly into guidance, ordinances, codes, or other implementation tools. These end goals should be a consideration as ClimAID is produced.

Another facet of communication is addressing the psychology of climate change, which plays an important role in motivating action (Kloeckner 2010). There is an interest among participants in solution-oriented content that provides avenues to respond to climate change in meaningful and feasible ways. Yet, there is tension between recommendations that ClimAID be positive and opportunity-focused and concern that the potential “opportunities” of climate change may be overstated. This concern was raised for two topics in particular: in the communication of potential benefits to the agricultural sector from longer growing seasons, and in the narrative of non-coastal New York State as a future “climate oasis.” Ultimately, there is a desire that any potential benefits related to climate change be included with adequate context and that the uncertainty around such outcomes be communicated clearly.

“They're not worried about whether or not it is going to be a 50-year storm. What they're really worried about is do they need...a 36-inch culvert...think about what the end product is.”

“Please clearly focus on identifying and gearing policy toward creating tangible benefits—cost savings and economic growth potential—to rural, upstate communities if they choose to engage in climate mitigation, adaptation, and resilience efforts. Frame the language in terms of disaster risk reduction and use appropriate messaging to appeal to inland, rural communities in order to reduce the probability that they view climate change as a predominantly coastal issue.”

## 4.2 Downscaling Data

There is significant demand for downscaled climate data across sectors and organization types. While there are instances in which detailed local data are useful for decision-making, ClimAID states that “some adaptation strategies can be initiated in the absence of region-specific climate change projections” (ClimAID 2011, p. 37). There is, however, a lack of clarity among respondents regarding which decisions require downscaling, which do not, and the accompanying uncertainty of downscaled data.

The ClimAID update may consider further downscaling the regional climate projections if such an option is feasible, and where there is relatively consistent feedback—for example, around separating New York City from Long Island. However, it is worth noting that many respondents indicated interest in data at the county scale. More specific regional projections will not necessarily fill this request and therefore should be accompanied by a more explicit description within ClimAID of how regional climate projections can be incorporated into local decision-making. While some respondents who were more familiar with data recognized the limitations of downscaling and felt able to make decisions with the information available to them, others indicated that lack of more spatially explicit information was a barrier to decision-making. However, when asked what decisions they would be able to make with downscaled data that they could not make now, respondents generally stated that the kind of decision would not change; rather, their confidence in the decision would increase. It seems that localized data gives decision-makers more confidence despite increased uncertainty in the data itself at finer spatial scales. This discrepancy could be addressed in ClimAID and offers an opportunity to bridge a gap in adaptation implementation.

“it’s a little bit harder to parse out how you can take action on certain things when the data is at a higher level.”

“more accurate, downscaled models might help us be more confident, but I don’t think that’s going to encourage decision making any differently than it does today.”

“You have to do some education on...why [you] can’t infinitely downscale it. Like there’s some really good reasons why you just can’t be downscaling something.”

“sometimes you can lose a little bit of accuracy when you downscale too much, but I think, especially for trying to get individuals or communities to take action, the more downscaled the better. If you can show them something that’s very specific to their personal property it makes a big difference.”

### 4.3 Environmental Justice

In the original ClimAID report, Environmental Justice was one of five integrating themes along with climate, vulnerability, adaptation, and economics. There is interest in environmental justice being more prominently featured in the ClimAID process and content for the upcoming assessment. The integrating themes are incorporated into each sector chapter; however, it is generally viewed as an omission that there is not a chapter dedicated to environmental justice. Given data gaps around disaggregated social and economic data raised by respondents, a chapter or section of ClimAID specifically addressing environmental justice has the potential to fill an important role. Particular focus is on data and information regarding underinvested communities, tribal communities, and rural communities across the State.

In addition to a greater focus on environmental justice within the content of the report, opportunities for equity and inclusion in the process must be prioritized. Sector leaders and experts can be diversified, both in terms of areas of expertise and the types of institutions they represent. Climate assessments, and scientific endeavors more generally, often consider expertise to be held within a narrow set of institutions (Carrozza 2015, Silke and Forsyth 2015). Selection of experts from more diverse institutions within and outside of academia would enable the inclusion of multiple evidence bases and forms of knowledge—including technical, local, and traditional ecological knowledges (TEK)—which would improve the quality of the assessment (Tengö et al 2014). Training in ethical collaboration should be considered and is an important component of ensuring that all parties benefit from cross-cultural partnerships between climate scientists and indigenous communities (Kirby et al 2019). For the 2011 ClimAID report, sector leaders were responsible for identifying relevant stakeholders for their respective sectors. It is therefore critical that the sector leaders themselves are representative of

“needs much more of a social and environmental justice focus (chapters not aside mentions).”

“for social data, I would categorize by income/race/tribal groups.”

“Equity was built into the first report but could really be expanded at this point.”

“more social data and in-depth narratives about the vulnerability of low-income and tribal communities.”

“Detailed [information] for our County... would be helpful. Because we are rural and not near any cities we are often ignored.”

“You definitely have to include people...like you're reaching out now. So, when it comes time to update this, have some people from different parts of the state. Different socioeconomic backgrounds, different lifestyles. I just think that really people need to have the opportunity to say how they're impacted and what they need to thrive in this world like everyone else.”

diverse backgrounds, perspectives, and knowledge systems. As sector leaders may have differing understandings of or experience with stakeholder engagement, NYSERDA may consider standardizing some aspects of the engagement process to ensure accountability and clear expectations, as well as consistency across chapters.

## 4.4 Scenario Planning

Scenario planning and adaptive pathways are increasingly utilized methods for long-term, strategic environmental planning. Adaptive pathways outline decision points over time (Bosomworth and Gaillard 2019), while scenario planning facilitates decision-making under uncertain futures (Cobb and Thompson 2012). Multiple respondents indicated interest in and made recommendations that align with such strategies, although the terms themselves were not specified. Qualitative data and management strategies are seen as assets in environmental planning, particularly to complement local data gaps and limitations in downscaling climate information. There is a high level of interest in understanding what the climate projections “mean” for a particular region or sector. Multiple respondents suggested that if quantitative information cannot be provided for a climate impact (e.g., intense precipitation), it is useful to have localized descriptions of what such events might look like by region and/or sector as a form of storytelling. These types of qualitative descriptions of possible futures align closely with scenario planning. Scenarios were also described as a useful communication tool for engaging the public, a strategy applied in other contexts and geographies (Fresco and Timm 2016).

Respondents also expressed that they would like to know how proposed local policies would impact the emission scenarios for New York or their particular region of the State, to more directly connect decision-making to projected climate impacts. There is a sense that the RCPs used are relatively abstract and unresponsive to decisions made at local scales. A better understanding of how particular policies or actions would impact emission scenarios

“when you start talking about models and projections, it's easy to turn off...It's worked much better when speakers were speaking in relatable things that farmers have experienced themselves. So absolutely scenarios are more effective communication.”

“I would like to see a discussion of present and proposed policy actions in relation to modelling projections of climate-induced impacts, and a discussion of how the use of policy options reflects differences in projected climate impacts between regions.”

“I feel as if there's a lot of policy change coming and...the RCP scenarios are very broad. It would be nice to be able to relate it to local policies that are coming in the immediate future and seeing how they would relate to these scenarios.”

would be useful in an adaptation pathways framework, as a means to better delineate timelines for decisions and interconnections between mitigation and adaptation responses taken at varying levels of government in the State.

## 4.5 Silos

There are jurisdictional and disciplinary silos that negatively impact climate action and adaptation (Nordgren et al 2016). Respondents spoke of the barriers to working across departments or agencies with differing mandates as well as challenges related to attempts to address integrated climate challenges in isolation. The ClimAID update can potentially contribute to bridging these gaps by rethinking how information is presented in the assessment. For example, transportation infrastructure is a topic for which there is expressed interest in increased collaboration between State, county, and town governments. Roads—and other related infrastructure including culverts and bridges—cross jurisdictional boundaries but function as a network, making it particularly important that decision-making at various levels of government does not work at cross-purposes. ClimAID could consider fact sheets or how-to guides tailored to such cross-jurisdictional issues, which may facilitate more integrated planning. Interest in streamlining work across boundaries extended beyond State lines, with several suggestions relating to collaborating and sharing information with cities across the region, as well as neighboring states. Watersheds, transit infrastructure, and many other natural and human systems cross state boundaries and therefore may benefit from consistent climate information and planning. While ClimAID offers State coverage, it may be valuable to consider how the assessment could contribute to goals of integrated regional climate planning.

“watersheds crossover municipal boundaries all the time, so if you get an agency that isn’t able to put in larger pipes, that can be more prone to flooding. Or, if there’s a failure, sending that flooding downstream as we’re seeing with the dam failure out in Michigan.”

“One thing that I have discussed in some other forms is going beyond the state level...how we can leverage some of the information we’re using to have common data that’s being used between New York [City] and Philadelphia for example, because we do sometimes get into this situation where we have interlinked water systems—water supply—but we’re using different information.”

“regional consistency/collaboration with neighboring states on projections for shared regions (e.g., NY/NJ harbor).”

Wider strategic dissemination of the report can also contribute to bridging these gaps by connecting audiences directly with scientists through workshops (see the Stakeholder Engagement section). Building networks which bring climate scientists and practitioners together was specified as an effective strategy for overcoming barriers related to siloed environmental decision-making, for example, within invasive species management. Given the existing network of ClimAID sector experts, authors, and collaborators that has been built over multiple iterations of the assessment, NYSERDA may be well-positioned to facilitate such networking through dissemination and outreach related to the ClimAID update.

## 4.6 COVID-19

While not an explicit focus on this report, COVID-19 and its implications for environmental planning emerged as a recurring theme. The pandemic was referenced in calls for better integration of planning across sectors including health, economic development, and agriculture. There is a sense that COVID-19, and its far-reaching impacts, has revealed the interconnectivity and collaboration needed to address systemic risks.

An additional concern raised among participants in relation to the pandemic is potential cuts to funding and capacity for environmental planning. COVID-19 provides an example of the challenges associated with combined funding streams, with respondents indicating that municipalities' climate planning budgets may be severely limited as a result of redirected funds. Developing proactive, flexible, and sustainable funding for climate action is a continuous challenge (Moser et al 2019), amplified by the current pandemic. The impacts of climate change will likely lead to increasingly complex challenges which will require departments to navigate multiple threats

“we are very lucky in the city with the level of detail we have for the projections that have been provided but I think we need to go a step beyond that. And there are enough people embedded in city government at this point that we could probably do it without too much hand holding from the research community, but it would certainly take some understanding and probably some back and forth on whether we're interpreting the information correctly.”

“tying in health to climate is important for messaging. There's a real issue with making all of this relevant to people's lives and being able to really have the community have an understanding and build community support for the policies we want to implement. And I think that health can be a real place for that. Now with the current pandemic, I guess that maybe becomes more obvious than it was a couple months ago.”

“with what's going on with COVID response...I think it's a really powerful moment to kind of lean into that and to integrate not just the economic pieces with it, and the food insecurity pieces with it, but make sure that...climate change is being considered.”

simultaneously (Wilbanks and Kates 2009). It would be of value to consider how ClimAID and the assessment process might contribute to increasing the capacity of governments and organizations to address or plan for multiple risks.

COVID-19 has also served as an example of the importance of science communication. Respondents compared the language and approaches used in communicating technical epidemiological information to the public to those used in communicating climate change. As the process of the ClimAID update unfolds, it is important to consider best practices in climate communication to maximize the impact of the assessment.

“Funding for planning and implementation without cost share. After COVID, I doubt any muni[cipalities] will have planning funding.”

“some of it is a language issue and some of it is a graphical issue, helping people understand what the graphs really mean. The situation we're in right now is a classic example. There's lots of graphs out there on what's happening with this COVID-19 issue and some of them are easier to understand and some are not, [it] especially gets challenging when you start getting into items such as return rates, and exponential curves.”

## 5 Conclusions

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Since its original publication in 2011 and projections update in 2014, ClimAID has been utilized as a source of climate information by a wide range of stakeholders, organizations, and government entities across New York State. There is high demand for an updated climate assessment to inform climate action planning. This needs assessment serves as one of many opportunities to integrate diverse feedback into the ClimAID process. By exploring the existing gaps, current uses, and future needs for climate information, priorities have emerged across regions and sectors. There is interest in equitable, actionable, integrated climate information that is communicated effectively to a range of audiences and allows for data interactivity. As New York State continues to adapt to a changing climate, there is growing need for information that bridges the gap between planning and implementation with tailored information for various jurisdictional levels of decision-making. A summarized list of the recommendations included in the needs assessment can be found in appendix B.

Addressing the impacts of climate change will require transformational changes that extend beyond the scope of any one assessment. However, ClimAID and other climate assessment processes can play an important role in network- and capacity-building in addition to the provisioning of information. Over the past decade, ClimAID has brought together leaders spanning institutions, expertise, and locations. The assessment update provides an opportunity to facilitate relationship-building across multiple divides: scientists and decision-makers; governments at multiple jurisdictional levels; and importantly, those who have historically been included in and benefited from assessment processes and those who have not.

“Do this as fast as you can. Don’t push too much for perfection.”

“It’s really great that the state does it. It needs to continue. It needs to continue to be well funded. It needs to continue to bring in qualified scientists to help.”



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# Appendix A. Outreach List

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The following table includes all stakeholder, community, and government groups mentioned throughout the needs assessment, which serves as a potential outreach list. The table includes specific organizations as well as general categories of people or organizations. Further research may be necessary to identify appropriate contact individuals. The list includes suggestions from survey respondents as well as groups mentioned by interviewees.

**Table A-1. Suggested Outreach List**

| <b>Specific Outreach Suggestions</b>                                 |
|--|
| Adirondack Association of Towns & Villages                           |
| Adirondack Watershed Institute                                       |
| American Farmland Trust  |
| American Society of Adaptation Professionals                         |
| American Zoo and Aquarium Association                                |
| Army Corps of Engineers  |
| Association of Science & Technology Centers                          |
| Capital District Regional Planning Commission                        |
| CaRDI  |
| Center for Native People and the Environment at SUNY ESF             |
| Central New York Regional Planning and Development Board             |
| City of Ithaca   |
| Cornell Cooperative Extension  |
| Cornell Cooperative Extension - Community & Energy Program Work Team |
| Cornell University   |
| Department of Corrections and Community Supervision                  |
| Department of Energy   |
| Department of the Interior   |
| Designing to Live Sustainably  |
| Dutchess County Climate Smart Communities Task Force                 |
| Eastern Lake Ontario Dune Coalition                                  |
| Empire State Forest Products Association                             |
| Environmental Protection Agency                                      |
| Finger Lakes Institute   |
| Geographic Information Sharing Special Interest Group (GIS/SIG)      |
| Great Lakes Integrated Sciences and Assessment (GLISA)               |
| Haudenosaunee Climate Task Force                                     |
| Hudson Valley Regional Council                                       |
| International Code Council   |
| International Living Future Institute                                |

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|---|
| Long Island Clean Energy Leadership Task Force                      |
| Museum Association of New York State                                |
| Museum of the Earth   |
| National Guard  |
| National Oceanic and Atmospheric Administration (NOAA)              |
| National Renewable Energy Laboratory (NREL)                         |
| Natural Areas Conservancy   |
| National Weather Service  |
| New Jersey Board of Public Utilities                                |
| New Jersey Economic Development Authority                           |
| New York Attorney General's Office                                  |
| New York Council for History Education                              |
| New York City Panel on Climate Change (NPCC)                        |
| New York Farm Bureau  |
| New York Sea Grant  |
| New York State Building Officials Conference                        |
| New York State Clean Energy for Agriculture Task Force              |
| New York State Department of Agriculture and Markets                |
| New York State Department of Environmental Conservation             |
| New York State Department of Health                                 |
| New York State Department of Health – BRACE Program                 |
| New York State Department of State                                  |
| New York State Department of Transportation                         |
| New York State Division of Homeland Security and Emergency Services |
| New York State Education Department – Board of Regents              |
| New York State Floodplain and Stormwater Managers Association       |
| New York State GIS Association                                      |
| New York State Outdoor Educator Association                         |
| New York State Parks Recreation & Historic Preservation             |
| New York State Turf and Landscape Association                       |
| New York State Water Resources Institute                            |
| Northeast Climate Adaptation Science Center (CASC)                  |
| Northeast Regional Climate Center                                   |
| Northeast Regional Invasive Species and Climate Change Network      |
| NYC Department of City Planning                                     |
| NYC Department of Citywide Administrative Services                  |
| NYC Department of Education   |
| NYC Department of Education   |
| NYC Department of Health and Mental Hygiene                         |
| NYC Department of Parks & Recreation                                |
| NYC Mayors Office of Resilience                                     |
| NYC Office of Sustainability  |
| OGS Design & Construction   |

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|--|
| Paleontological Research Institution   |
| Push Buffalo   |
| RENEW Institute  |
| Rutgers University   |
| Save The River   |
| Science Teacher Association of New York State  |
| Sciencenter  |
| Society of American Foresters  |
| Sustainable Saratoga   |
| Syracuse University  |
| TetraTech  |
| The Farm Bureau  |
| The Nature Conservancy   |
| The Northeast Sustainable Energy Association   |
| The Wild Center  |
| The Wild Center's Adirondack Youth Climate Program   |
| Tompkins County Climate Protection Initiative  |
| Tompkins County Environmental Management Council   |
| Town of Ithaca   |
| Tug Hill Commission  |
| U.S. Department of Agriculture – Natural Resources Conservation Service  |
| U.S. Department of Agriculture- Plant hardiness experts  |
| U.S. Geological Survey   |
| U.S. Green Building Council  |
| University at Buffalo  |
| University at Buffalo Regional Institute   |
| University at Buffalo Sustainability   |
| Upstate American Planning Association Chapter  |
| Watershed Agricultural Council (WAC)   |
| Westchester County Government  |
| <b>General Outreach Suggestions</b>  |
| Active New York State Department of Environmental Conservation Climate Smart Communities local committees or task forces |
| Architects   |
| Aviation facilities  |
| Chambers of commerce   |
| Churches/synagogues/temples  |
| Community Boards   |
| Community-based organizations  |
| Consultants who are hired to prepare hazard mitigation plans for municipalities  |
| County planning departments  |
| County-Based Environmental Management Councils   |
| Educational institutions (at various levels)   |
| Engineers  |

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|--|
| Environmental nonprofits                       |
| Farmers  |
| Federal agencies                               |
| Federal land management agencies               |
| Floodplain administrators                      |
| Green industry                                 |
| Hospitals                                      |
| Lake Associations                              |
| Local governments                              |
| Local health departments                       |
| Local highway agencies                         |
| Local municipalities                           |
| Local planning boards                          |
| Neighboring states                             |
| Neighboring cities in the northeast region     |
| New York state agencies                        |
| Park visitor information/interpretive exhibits |
| Public school districts/schools                |
| Regional planning and development boards       |
| Regional Planning Councils                     |
| Rural communities                              |
| Science teachers                               |
| Soil and Water Conservation Districts          |
| Stormwater facilities                          |
| Students                                       |
| Teachers                                       |
| Telecom providers                              |
| The press/news media                           |
| Tribal governments                             |
| Unions   |
| Universities                                   |

## Appendix B. Summarized Recommendation Chart

The following table summarizes the recommendations found throughout the report, including direct requests from respondents as well as suggestions inferred from respondent information by the author team. This table highlights the primary recommendations from each section and should not be considered comprehensive; please refer to details in the respective sections of the report for additional information. Recommendations in the table may not be feasible given modelling or other constraints (particularly in the Climate Projections section), and in some cases, conflict with one another or present trade-offs that must be carefully considered. The table therefore serves as a bank of potential options, rather than a strategy in which all suggestions are necessarily pursued.

**Table B-1. Summarized Recommendations**

| <b>Respondent Demographics</b>  |
|---|
| Outreach to Region 6: Tug Hill Plateau  |
| Outreach to tribal governments  |
| Outreach to non-government entities, including academia & the private sector                            |
| <b>Written Outputs</b>  |
| Add the built environment as a ClimAID sector with dedicated chapter                                    |
| Develop a climate education output designed with and for educators                                      |
| ClimAID summary specifically for youth  |
| ClimAID summary specifically for the general public   |
| ClimAID summary specifically for policy makers  |
| A “practitioner’s glossary” that defines and contextualizes common climate terms                        |
| Factsheet on funding climate action   |
| Factsheet on climate communication  |
| Factsheet(s) on “levers of change” available to varying jurisdictional levels                           |
| <b>ClimAID Regions</b>  |
| Separate New York City from Long Island   |
| Further downscale the regions   |
| Align regions with REDC   |
| Align regions with DEC  |
| Separate upper and lower Hudson Valley  |
| Explain rationale for the regions, clarifying whether they are based on climatic or economic breakdowns |
| <b>Online Outputs</b>   |
| Open access/downloadable data   |
| Online mapping features   |
| Climate information mapped with social and economic data  |
| Map flooding and inundation in the coastal zone   |
| Downloadable versions of infographics and charts  |
| Develop PowerPoint presentations/slides for technical and non-technical audiences                       |



| <b>Climate Projections</b>  |
|---|
| Provide more detailed explanations of the capabilities and limitations of projections   |
| Inclusion of a temperature indicator for 100-degree days or above   |
| Align the heat wave indicator with the Department of Health definition  |
| Inclusion of projections (or more detailed qualitative descriptions) of intense short duration precipitation events                             |
| Sea level rise projections in decadal time slices   |
| Visualization and mapping of sea level rise projections onto the landscape  |
| Standardize sea level rise depths (i.e. 1 ft, 3 ft and 6 ft) rather than the year (i.e. 2020, 2050, 2100)                                       |
| Continued inclusion of a “rapid ice- melt scenario”   |
| Inclusion of sea level rise projections past 2100   |
| Inclusion of humidity projections   |
| Use of “Sandy-like events” as a reference point for projected storms and extreme events   |
| Inclusion of projections (or qualitative descriptions) of coincident/concurrent extreme events  |
| Inclusion of more detailed drought information  |
| Inclusion of Great Lakes water levels/ice cover projections   |
| Inclusion of climate-induced land degradation/land use change projections   |
| Inclusion of seasonal change projections  |
| Inclusion of air quality projections  |
| Increased focus on high emission scenarios/RCPs   |
| Removal or adjustment of low emission scenarios/RCPs  |
| <b>Research Gaps</b>  |
| Research gap filler: increased ecological monitoring for climate change impacts on ecosystems   |
| Research gap filler: Planning for a winter-peaking electric system  |
| Research gap filler: climate change impacts on vector-borne disease   |
| Research gap filler: disaggregated social and economic data relevant to identifying vulnerable populations                                      |
| Research gap filler: Heat-health adaptation   |
| Research gap filler: climate migration projections and impacts  |
| Research gap filler: Funding adaptation planning  |
| Research gap filler: Overcoming legislative roadblocks to climate action  |
| Research gap filler: Strategies for cross-jurisdictional infrastructure planning  |
| <b>Case Studies</b>   |
| Inclusion of case studies at multiple jurisdictional levels (i.e. state, tribal nation, county, city, town, ecosystem, and neighborhood scales) |
| Specify the “levers and tools” applicable to each scale of governance   |
| Focus case studies on adaptation implementation   |
| <b>Economic Impacts</b>   |
| Collaboration and alignment with New York’s Regional Economic Development Councils  |
| Research on novel funding mechanisms  |
| Case studies related to securing funding  |
| Fact sheet with resources on existing funding sources and grant application assistance  |
| Assessment of the costs of adaptation actions, and of inaction  |
| Assessment of the non-monetary benefits of adaptation actions   |
| Prioritize economic impacts on vulnerable communities, with an explicit focus on the underlying causes of disparities in risk                   |

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|--|
| <b>Stakeholder Engagement</b>  |
| Engage with tribal governments and community-based organizations to incorporate feedback into forthcoming phases of the ClimAID process; correct for the relatively little engagement in this Needs Assessment |
| Collaborate with educators and educational institutions at various levels (primary through tertiary)   |
| Collaborate with regional planning councils  |
| Include individuals outside of academia as sector experts and chapter authors for the ClimAID update   |
| Collaborate with the New York City Panel on Climate Change (NPCC) to streamline the provision of consistent climate information across the state   |
| Plan community workshops in which audiences can directly engage with experts on the content and application of the assessment  |
| Host training programs to develop competency with the ClimAID report among trusted organizations across the ClimAID regions  |
| <b>Communicating Climate Information</b>   |
| How-to guide on incorporating the assessment information directly into guidance, ordinances, codes   |
| Avoid overstating the potential “opportunities” of climate change, and provide adequate context for any potential benefits included (i.e. longer agricultural seasons)   |
| Focus on implementation actions and solutions-oriented language to encourage action  |
| <b>Downscaling Data</b>  |
| Consider downscaling the regional climate projections  |
| Describe how regional climate projections can be incorporated into local decision-making, to clarify when more localized data is and is not necessary  |
| Explain the uncertainty associated with downscaling in user-friendly language  |
| <b>Environmental Justice</b>   |
| Inclusion of an environmental justice chapter  |
| Address the unique contexts of underinvested communities, tribal communities, and rural communities  |
| <b>Diversify sector leaders</b>  |
| Select experts from more diverse institutions within and outside of academia to enable the inclusion of multiple evidence bases and forms of knowledge   |
| Training in ethical collaboration for staff, experts, and sector leaders   |
| Standardize aspects of the engagement process to ensure accountability and clear expectations, as well as consistency across chapters  |
| <b>Scenario Planning</b>   |
| Complement quantitative information about extreme events and climate projections with localized descriptions of what events might look like by region and/or sector  |
| Relate RCPs and projections to local policy actions  |
| <b>Silos</b>   |
| Include how-to guides tailored to cross-jurisdictional issues (i.e. transportation or infrastructure planning)   |
| Collaborate and share climate information with cities across the region, as well as neighboring states   |
| Utilize NYSERDA’s networks to bring climate scientists and practitioners together for stakeholder workshops prior to and following publication of ClimAID  |
| <b>COVID-19</b>  |
| Address the impact of COVID-19 on environmental planning and funding in ClimAID  |
| Highlight the importance of integrated planning & provide examples or case studies related to navigating multiple threats simultaneously   |

## Appendix C. Full Survey Responses (Select Open-Ended Questions)

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The following series of tables include full responses to a selection of open-ended survey questions, to provide additional context for the points made and conclusions drawn in the needs assessment. Responses are unedited except for the removal of personal contact information, and resultingly may include grammatical and spelling errors. Survey responses are intended to reflect participants' individual opinions and perceptions; where respondents have included outside or background information, the information has not been fact-checked and therefore may not represent factually correct or up-to-date information.

| <b>How do you use climate projections in your work?</b>  |
|--|
| In support of research for NYSERDA and our regional clients (e.g., cities/towns)   |
| infrastructure risk assessment, master planning and general planning work, NYSERDA Clean Energy Communities and NYSDEC Climate Smart Communities work  |
| Working with communities to prepare plans/implement projects/understand and prepare for future climate impacts (alone and as an influence on existing coastal hazards). There is a heavy education elements as well (going to communities, talking about risk- having up-to-date and local climate projections is key)   |
| development of scope for capital infrastructure projects and planning  |
| To make future projections of streamflow, floods, and water cycle  |
| Per how it affects landscape plants, crops, invasive species and food plants.  |
| predicting brook trout resilience to climate change  |
| We use climate projections for policy recommendations  |
| When advising on the use of mitigation approaches, we need to look towards the life of the structure for flood elevations  |
| To develop county level projections for extreme heat   |
| incorporate into agency design standards and capital planning  |
| Inform stakeholders for projects and research on the Hudson River. Inform shoreline designers about what to design for. Include in outreach material   |
| Selection of site, building and building systems; city scale initiatives   |
| Currently we are working on a Natural Resource Inventory and have created a Climate Change chapter. The NRI provides a scientific basis for the development of methods and steps to preserve, conserve and utilize those resources by providing a compendium of existing information about our community's natural resources. Complete Streets is linked to climate as well. I would also like to create a Climate Resiliency Plan and Heat Mitigation plan for the city |
| consultant to organizations and published author of books on resilience  |
| Building Design and Engineering  |
| designing buildings for future conditions  |
| We have developed county-specific health-health profiles which include county-specific projections.  |
| Determining flood elevations to design to.   |
| To look at future weather cooling and heating hours, HVAC equipment sizing, power outage scenarios for passive thermal survivability under no backup power...  |

| <b>How do you use climate projections in your work? (continued)</b>  |
|--|
| how increasing storm frequency and intensity relate to road-stream crossings and flooding  |
| As inspiration ofr action, as story-telling, as range of things to consider. I prefer NOT to use data, becasue data incites debate.  |
| Invasive species temperature limitations and associated migrations of both invasive and native plant species   |
| We would like to use projections to have more accurate GHG savings calculations from our energy conservation measures. We will also need to look at our work in relation to long term future climactic projections as our GHG reductions targets have long range goals in 2025, 2030, and 2050 as part of Local Law 97 of 2019.  |
| in planning for climate change and for stormwater management calculation   |
| In hazard mitigation planning and preparing recovery and resiliency plans and actions  |
| Mostly Agricultural/forest impacts and storm projections impact in future development planning.  |
| I use the data in my work with flood resiliency  |
| Land use controls - hazard mitigation - design - funding allociations - long range planning  |
| In making decisions regarding upcoming County processes, capital projects, emergency planning, public health planning, etc.  |
| Developing adaptation and resilience policies and conducting vulnerability assessments   |
| to assess vulnerability of small landholder communities globally and determine adaptation measures accordingly   |
| Planning for facilities and infrastructure   |
| Assess climate impact on municipalities  |
| Where and how to construct multifamily housing to reduce ghg and adapt to changing climate.  |
| Agriculture related  |
| For Emergency Management Planning and Land Use Planning  |
| In design of storm water management systems and coastal development  |
| I use them in education and outreach programs.   |
| Outreach and education, municipal planning, policy development, research   |
| Adaptation, CLCPA  |
| Prepare reports such as Climate Action Plan, GHG Emissions; Climate Smart Communities  |
| policy development, basis of education and outreach  |
| We are responsible for outdoor environmental management in our downtown  |
| education about the importance of adaptation/mitigation  |
| To help develop local government plans and set priorities.   |
| As part of public talks I give on the status of climate change.  |
| Communicate how sea level rise will affect coastal birds and their habitats; project changes in coastal habitat (primarily beach/island and salt marsh) for wildlife; prioritize sites for habitat restoration, enhancement, and protection; understand and communicate projected changes in bird species distributions; communicate the need for nature-based solutions to coastal resilience |
| Precip impacts watershed planning. Temp info impacts future energy use.  |
| Support resource needs.  |
| Design for resilience and sustainability   |
| Anticipating tidal rise, temperature extremes and precipitation extremes for the built environment.  |
| Forcasting impats  |
| Hurricane, severe storm and advance trend forecasting  |
| Charcterize impacts to the energy sector from changes in extreme weather   |
| Predicting ecosystem change and individual species response, designing climate-ready culverts  |
| Renewable energy generation, grid resiliency, electric and gas reliability and price signals   |

| <b>How do you use climate projections in your work? (continued)</b>  |
|--|
| To share with stakeholders and plan for adaptive management.   |
| The CSC team uses them in educational presentations, in creating recommended actions for communities to take (through the CSC certification program), and in the planning and design of grant programs/projects for municipalities           |
| In planning for waterfront and coastal habitat restoration projects, as well as watershed planning. I account for projections in sea level rise and precipitation intensity, duration, and frequency.  |
| This may be why frequency of different data is varied in my responses - we use them for design guidelines, in which we are advising designers on how to design for acute and long-term hazards, as well as for informing policy and planning |
| identifying areas most threatened and most important places to work in now   |
| We use them as educational tools for teaching students and the public about current and future climate impacts, specific to their location   |
| I plant trees along streams. I try to plan for changing conditions in flooding, precipitation and heat in planning the species and the planting locations and the communication with landowners and municipal officials                      |
| To inform urgent long-term planning and community engagement needs   |
| Sustainability Planning, both mitigation & adaptation, for infrastructure, community development, climate equity, etc.   |
| The relationship of resiliency, building energy use and climate change   |
| Analyzing long term climate risk, studying impacts of current climate trends on economic conditions, estimates used for long term transportation planning  |
| as a science museum and trusted public authority, we want to make sure we have the best available and accurate science available on climate impacts  |
| We are an educational org--we share them with the public   |
| Determining areas critically important to protect  |
| To see how ecosystems are likely to change. To determine what land, species, ecosystems, natural capital/green infrastructure are most vulnerable and which are most critical to protect.  |
| Policy   |
| Helping the agency understand its vulnerabilities and prioritize climate risk mitigation projects  |
| General trends & understanding. To develop master plans. To develop & prioritize stewardship projects. To create place based assessments and plans (using GIS). Funding allocation for projects and on the ground work.                      |
| I use them to teach students about GCMs and how to be effective, literate citizens.  |
| In curriculum and teacher workshops ( <a href="http://www.riscnyc.org">www.riscnyc.org</a> )   |
| They are an educational tool to demonstrate the reality of climate change and the intensity of its impacts both on the global and local scales.  |
| It depends. Often times not me personally because of my role but when I am a lobby lead or others have lobby meetings we use them often.   |
| Planning and designing of resilient infrastructure. Operational response and preparedness to keep transportation system reliable.  |
| To create future-facing building code and land use strategies  |
| As a general reference for project planning (changing growing zones, identifying vulnerabilities to target adaptation, etc.)   |
| as a member of Program Advisory cmte on design of cooling systems for vulnerable population in NY City   |
| Planning, design, advisory   |
| To determine the need for adaptation and for resiliency measures   |
| To provide feedback on design & construction near shorelines, to inform tidal wetland restoration design, to inform tree planting efforts & plant selection, to identify heat vulnerable neighborhoods & greening interventions              |
| Public presentations, movement building  |

| <b>How do you use climate projections in your work? (continued)</b>  |
|--|
| What could be included in the next New York State climate assessment that would help to reduce these barriers?   |
| Access to data that can be readily incorporated into open source or commercially-available simulation software used in AEC industry  |
| Need information in a format that is useful to the management of the built environment (e.g., HDD, CDD, FTMY data, etc.).  |
| Better coordination and integration with NYS Climate Change Clearinghouse  |
| Improved regional projections; greater consideration given to Great Lakes water levels/ice cover projections   |
| Degree day data (past and present)   |
| A web-based application that could make projections at the county and watershed scale (e.g. - Mohawk, Genessee, etc.)  |
| No comment   |
| Possibly more direct application to the impacts that should be considered for major capital projects, particularly in the energy system, and the impacts on forest regeneration  |
| Ensure that detailed/relevant information is transmitted to our organization on a regular basis and shared.  |
| Projections of extreme precipitation events  |
| make projections for the sub-county level (towns)  |
| open access to data (e.g., full array of models/RCPs, rather than just percentile values)  |
| Reports similar in form to the Harvard ForHealth Initiative for buildings.   |
| Equity was built into the first report but could really be expanded at this point. ClimAID report was an important source on climate, but additional resources are needed on a county wide level. It did not address climate migration - population dislocation due to climate related issues. Taken from British Columbia report, some other ideas- <ul style="list-style-type: none"> <li>• Cost savings realized by considering climate change impacts in the regular maintenance/updating/renewal schedule of existing infrastructure and by planning for new infrastructure to avoid expensive upgrades later;</li> <li>• Advance identification and evaluation of adaptive measures in order to avoid unexpected adverse impacts;</li> <li>• Advance identification and prioritization of emergency needs prior to actual crises;</li> <li>• Exploration of opportunities for cooperation with other governments and agencies;</li> <li>• Community consultation and engagement in developing and implementing responses;</li> <li>• Initiation of actions to enhance the resilience of vulnerable ecosystems before environmental thresholds are reached; and</li> <li>• Establishment of local governmental policies to avoid committing to development patterns or development in areas that will pose significant risks for inhabitants over the longer term as a result of climate change impacts.</li> </ul> |
| continued imprimatur of NYS authorities as standard of care requirement of design & construction   |
| Section for Buildings  |
| Would like to see better flood risk information, with better spatial coverage and accounting for flood risk beyond that associated with sea level rise (I.e. flashing floods/flooding associated with rivers/lakes/streams).   |
| Targeted analysis for NYC and downstate  |
| More data download less written report with static images. Think about interactive reports that allow users to interact with geographical and climate data in an online platform...  |
| Distilling of data into what this shows us, in broad terms. We get debilitated by data.  |
| I do not know if these can be addressed by the report  |
| GHG coefficient projections for various typical fuels  |
| Detailed for our County information would be helpful. Because we are rural and not near any cities we are often ignored. Detailed data is our biggest missing link and then time/capacity to analyze it.   |
| more detailed climate information at the County level in particular for significant weather events.  |

| <b>What could be included in the next New York State climate assessment that would help to reduce these barriers?</b>  |
|--|
| Breaking down cost of climate impact. They'll only believe dollars.  |
| the issue is not only data but the time and resources to be able to use it. also, it is not only physical data but in-depth studies of communities (especially low-income and tribal) that is sorely lacking.  |
| Projected impact on flooding extent  |
| Don't know.  |
| Political/legislative solution so beyond scope of assessment   |
| Quantification of ghg reductions by activity; lists of effective ghg reduction activities; comparisons of energy versus embedded carbon reduction effectiveness; future 100 year flood plain projections; inventory of potential solar/wind field locations; inventory of potential micro-grid locations; inventory of areas where sea level rise is expected to make areas unusable.  |
| precipitation--temps--   |
| Data with confidence interval for extreme precipitation and/or extreme stream flows between 1% annual recurrence and probable maximum flood  |
| no opinion   |
| Political Change   |
| Interpretation of impact of climate trends on fisheries, habitats and other natural resources in the Hudson Valley, management strategies and considerations   |
| Regional and County breakdowns.  |
| projections of additional policy-relevant parameters   |
| More geograaphic specifciity   |
| executive summaries, very short "why everyday NYers should care" section for each.   |
| More specific data geographically, even for a small community.   |
| Stronger mandates for agencies to account for climate change characteristics   |
| county by county scenarios   |
| More focus on sea level change, storm (surge)  |
| Historic, current and projected clmate conditions that may impact reliable enegy supply  |
| Ease access and export of data.  |
| Great Lakes ecosystem coastal erosion and flood risks, and inland flooding information for the 200 year floodplain.  |
| Regional discussions with similar groups to help them understand how their work will be impacted. Unless we're able to articulate exactly what will happen without protection, we're unable to propose projects to funders to be able to implement any mitigation or adaptation strategies in our restoration projects.  |
| Funding request  |
| Easy-to-use online tools for accessing the info, especially via a map and at a county-level scale  |
| More focus on precipitation- and heat-related projections and variables  |
| Carbon footprints of all forms of energy usage   |
| Two things - 1) regional consistency/collaboration with neighboring states on projections for shared regions (e.g. NY/NJ harbor); and 2) better reconciling of horizontal extent (sea level rise bath tub models) displays of sea level rise projections with elevation data (even better if we can improve reconciling of combined precip + slr flood models). The latter is more of a need for usable tool for planning and design. Ideally, this would be a regulatory layer based on either FEMA + 2050, 2080, 2100 projections or something better so that designers and planners know which areas to avoid or floodproof. NYC is doing this; we need this everywhere...and while FEMA elevation recs are flawed, they are the best we've got/we need this or better, incorporating SLR |
| more educational tools for students - connecting CliMaid to school curriculum  |
| More info about woody plant species change and recommendations   |
| user centered easy to query data tools, particularly on probability distribution   |

| <b>What could be included in the next New York State climate assessment that would help to reduce these barriers? (continued)</b>  |
|--|
| climate change education in NYS (for K-12, college, technical, tribal, and informal education institutions) is currently not coordinated or strategic at the scale it needs to be in order to address the impacts and build the public will & capacity for solutions. The lack of coordinated climate education across the state at all scales is a major barrier. Assess the state of climate change education across the state in ALL sectors (not just K-12). How can we work collaboratively across the state to not only provide up to date accurate climate science and understanding of the regional impacts, but also a coordinated educational effort to make SOLUTIONS visible and doable? How can we use education to help build the necessary innovationm creativity, and expertise to meet the goals of the NYS Climate Act?Look at ClimeTime in Washington State - initiated by the Gov Office and supported through significant state and private sector funding. |
| Make clear issue that require collective action such as policy and regulation and those that can be mitigated by individual action. People need to understadn the need for regulation and the public needs to accept it and help pressure law makers. Simply say--this require regulation to change the trajectory.  |
| Identify funding program to help organizations working on climate change.  |
| agriculturally focused and summaries   |
| Guidance on a worst-case "rapid ice melt" scenario like the "ARIN" scenario in the latest NPCC report  |
| resources for technical assistance   |
| A separate document that is written for an audience of young people - ages 14-17.  |
| A section about the vital importance of climate literacy/the necessity of climate education in all of our schools, so that future generations are informed and equipped with knowledge and tools to solve the challenges that climate change is already presenting.  |
| Simple, easy to comprehend summaries to accompany the highly technical data presented. You could even release multiple versions of the report that are highly, moderately, and minimally technical so that readers could chose which version is best for them based on their interest and experience.  |
| Recommendations for sources of funding.  |
| Sub-hourly extreme precipitation projections.  |
| Examples of how municipalities or organizations statewide incorporate climate projects into climate adaptation policies  |
| Regional climate change projections & modeling   |
| make information more readily available, prepare fact shhets/summaries of work in policy-friendly languauge  |
| Links to funding sources, simplified grant applications process  |
| Community specific examples in each region/county including variations for urban, rural, costal, forested, agricultural, etc.  |
| Regional climate change projections  |
| Interactive maps that would allow users to view data across multiple scales / time horizons, factsheets  |
| United States  |
| <b>What climate variables would you like to see in the next New York State climate assessment?</b>   |
| All (or most) of the variables used in TMY files.  |
| projected climate impacts to agricultural land productivity  |
| sunny-day tidal flooding (i.e., high tide flooding without a storm); Great Lakes water levels  |
| Degree Days  |
| temp., precip., snow, ET, streamflow, sea level  |
| If severe storms will become more common, including torandic activity.   |
| Upstate flooding/severe weather impact on homes and transportation. Impact of moving NYC up into the hudson valley.  |
| Average and extreme precipitation; Probable peak streamflows (1% flood)  |
| more granular, customizable projections for extreme heat and precipitation (e.g., allow user-selected values)  |
| salinity in Hudson River and water level changed in Great Lakes. All variables already provided  |



| <b>What climate variables would you like to see in the next New York State climate assessment?<br/>(continued)</b>  |
|---|
| Biodiversity emphasized; climate as one part of interconnected system of Planetary boundaries/systems; impact on health   |
| Since increases in extreme heat and storm intensity are expected for our region, it would be helpful to have information specifically about mitigation and adaption techniques. It also would be interesting to have updated user friendly climate education materials available. |
| consider comparing decadal change in temperature & precip...  |
| impact on great lakes (seiche events, water level/flooding, etc)  |
| Heat, precipitation, sea level rise, flood risk, special emphasis on vulnerable populations, projects that account for likely population migration, how climate refugees from other areas are likely to impact NYS (how can we better prepared to accept this groups?)...         |
| SL and precipitation projections for the MTA service territory.   |
| Temperature is a given, humidity projections are really rare so that will be very helpful. Future rain projections also very much needed.   |
| Huh. I am not sure I understand the question. Let's understand the world of hurt we are moving toward, and what things we must do to stay on a trend to zero GHG.   |
| Perhaps more examples of benefits for specific invasive species   |
| Average temperatures/relative humidities, high and low temperatures / relative humidities, sea level rise, tidal level rise, air pollution change projections, ambient CO2 change projections   |
| extreme heat for my area, extreme weather, precipitation  |
| Comprehensive list of all known climate changes/impacts/variables, even if no full data   |
| more social data and in-depth narratives about the vulnerability of low-income and tribal communities   |
| Extreme events predictions  |
| Don't know.   |
| Heavy winds; pest changes;  |
| detailed forecasts  |
| extreme rainfall  |
| no opinion  |
| Sea level change projections by decade  |
| Temperature and precipitation averages and extremes, sea level rise, storm frequency and intensity  |
| All of them   |
| More info on air quality - specific to region   |
| drought, Great Lakes water levels, ocean warming, sea surface temperature, seasonal transitions, lake effect snow, snowmelt-related streamflow  |
| Projections of temperature  |
| The current ones used in the assessment -- pretty wide ranging as they stand.   |
| See previous responses.   |
| temp, precip, hurricane frequency, storm surge recurrence   |
| Variables that impact energy production, distribution and use, including sea level rise, extreme precipitation, drought, extreme heat and cold events.  |
| Same  |
| Extreme storms, flooding, 200 year floodplain, snowfall and snowmelt impacts, and drought risks and impacts.  |
| storm intensity, storm frequency, projected precip models for the region/watersheds, projected heat indices for urban areas, air quality advisory days  |
| Same as prior versions is fine.   |
| See above   |

| <b>What climate variables would you like to see in the next New York State climate assessment?<br/>(continued)</b>   |
|--|
| carbon footprints of all forms of energy usage   |
| snowfall, water level fluctuations, intense precipitation, equity considerations, the impact of proposed solutions   |
| More info about woody plant species change and recommendations   |
| Information on groundwater; shoreline erosion rates; wetland migration/degradation   |
| SLR, precipitation, drought, extreme heat, variability in temperature, tidal data (king tides, etc)  |
| climate change education in K-12, higher education, technical, tribal, and informal. Provide examples and case studies from across the state   |
| social justice--be clear about urban and rural impact differences  |
| NA   |
| Probabilistic sea level rise by decade, probabilistic storm surge elevations by decade   |
| sea level rise, flooding (statewide), precip (rain, snow, etc.), temp, Great Lake water level changes, extreme weather   |
| Impacts on urban communities, especially urban heat island   |
| See additional comments. For example, wind direction.  |
| storm surge, sea level rise, groundwater table rise, fluvial flooding/precipitation, heat  |
| precipitation and temperature; agricultural projections  |
| detailed maps of projected ozone, fine particles (PM2.5), regional methane levels, average and maximum temperatures, duration, intensity, and frequency of heat waves  |
| Urban Heat Island affect, Reduction of agricultural for housing (sprawl), what impacts have been made to date toward state goals (and how that changes previous projections)   |
| Probabilities relate to extreme events (i.e., probability of >90f days, probability of rainfall of >3inches) and average nightly temperatures  |
| updated sea level rise projections, projections of increase in number of extreme heat / precipitation events   |
| NY - Biodiversity declines and measure   |
| <b>What climate information do you need, but do not have access to?</b>  |
| Down-scaled / microclimate weather data  |
| Future TMY files.  |
| runoff projections   |
| I have lots of access through NE Regional Climate Center   |
| Easily accessible information at the local scale that agency staff can cite and require project sponsors to refer to under SEQR  |
| Peak projected precipitation data in a geographic region   |
| see above  |
| Localized weather data. The NOAA regional office is great, but many people do not know this resource. The official weather stations for Saratoga Springs are the Albany Airport and Glens Falls Airport. There is a local weather station but this takes some work to navigate the NOAA website to obtain. |
| NYS data among best in US...other states need to do similar  |
| Better flood risk information...FEMA flood maps do not cover all counties in NYS and don't incorporate riverine flooding well.   |
| Flood modeling for the lower and mid-Hudson valley   |
| Humidity + rain. Also down-scaled climate models at lower resolution converted to energy simulation format (TMY, EPW file) are not available.  |
| Local ambient CO2 information  |
| clear indication on the application of climate change from state regulatory agencies   |
| cost of impacts  |

| <b>What climate information do you need, but do not have access to? (continued)</b>  |
|--|
| System map of how ALL climate changes are dynamically related; social science (policies, adaptation metrics, literacy, norms) that inform how people interact with climate science knowledge; ecosystem resilience/vulnerability/adaptive capacity to climate changes; information that can be used in climate adaptation pathways |
| more social data and in-depth narratives about the vulnerability of low-income and tribal communities  |
| Don't know.  |
| Guidance on which prediction level to use.   |
| link between climatic temperature and rainfall   |
| no opinion   |
| updated precipitation intensity curves that have statewide acceptance  |
| Impact on natural resources, interpretation of projections for landowners  |
| GHG Footprint for Suffolk County only - need update from 2010 report   |
| costs of failure to adapt  |
| projections of temperature   |
| None.  |
| Data organized to focus on Finger Lakes region -- Tompkins is considered Southern Tier under the categories used but is part of the Finger Lakes   |
| Impacts climate change will have on freshwater wetlands in NYS.  |
| not sure.  |
| downscaled parameters  |
| Do not have access to many of the data variable identified above other than sea level rise   |
| Watershed scale precipitation data.  |
| 200 year flood risk, updated coastal erosion hazards for Great Lakes shorelines, snowmelt impacts, and drought risks and impacts.  |
| It's not lack of access, it's lack of application, funding, time, and capacity. We would need access to people who could assist us.  |
| The information is out there, it is obtaining local buy-in that presents the problem   |
| See above  |
| Long term climate change and weather patterns  |
| more information on how proposed solutions and how NYS climate targets will impact projections   |
| Not sure. I have not spent enough time looking.  |
| Projections on climate refugees/immigrants and projected human migration patterns.   |
| probability distribution curve (please do not base this on recurrence intervals, we need frequencies and probabilities)  |
| Coordinated messaging - basically the NYSERDA needs a marketing team and brand for clear and consistent climate messaging across the state, what are the impacts and what are examples of solutions that are working?  |
| Help us help others understand the need for strong policy, incentives, regulation  |
| NA   |
| What are the tipping points? Also, GIS models for impacts statewide (flooding, storm events, temp, weather levels, other climate hazards / impacts, species ranges, invasive movement)   |
| Groundwater table rise, wind speeds  |
| gasoline fuel consumption data by county (could use tax data to determine this), Utility consumption data aggregated by census tract, what the electrical demand for every vehicle in New York State to be electrified would be  |
| Regional level climate projections   |

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| Examples of NYS climate adaptation projects underway and their status, what actions are currently being taken to address environmental inequity  |
| Blodiversity and extinction rates in region and across state; Great Lakes information  |
| <b>The map below shows the seven climate regions of New York State used in the prior ClimAID Reports. Is there anything you would change about these regions for the next ClimAID Report?<br/>- Yes, I would change the regions (please specify what you would change)</b>   |
| It would be good to reference these against the standard statewide economic zones -- they do not align well for economic studies of impacts.   |
| Choose either: 1) correspondence to existing REDC's in order to reinforce coordination with regional economic planning for clean energy economy or 2) divide into climate zones as per further guidance from meteorological experts  |
| Consolidate the lower eastern hudson river region with the catskill mtns.  |
| East side of Hudson from Columbia County south   |
| Not at scale of useful granularity (i.e., Onondaga is very different than Jefferson as is Oneida from Westchester yet they are grouped into the same regions; Oneida and Madison share more with Onondaga than Putnam, for example). These regions are not helpfu.   |
| Every state agency defines regions and there should be consistency or these regions should reflect the weather conditions. Saratoga will not face the same climate change impacts as Westchester or Putnam County. For example, the loss of winter snow effects tourism and the ski industry in this region. We are in a different growing zone. And basic county economics are very different.  |
| More specificity   |
| Consolidate Regions 2,4,5  |
| Not really change the regions, but increase awareness of microclimate  |
| Separate NYC from Long Island. The Urban Heat Island effect of NYC changes the local climactic data  |
| I understand the need for regions but we have microclimates in our own county so I don't see how you can use such large areas effectively.   |
| I would separate Oneida, Herkimer and Madison County   |
| consider resources in regions - Herkimer and Saratoga are VERY different than Putnam and Westchester   |
| Use NOAA climate regions   |
| for social data, i would categorize by income/race/tribal groups   |
| Seperate Mohawk Valley from east of Hudson.  |
| I would try to group regions more by water body/current growing region: add Greene, Ulster, Orange, and Rockland to the other Hudson Valley communities (green); Sullivan, Delaware, Schoharie to the southern tier counties (yellow); Madison, Oneida, Lewis, Herkimer, Hamilton, Warren, Franklin, Essex, and Clinton (blue), include all counties along the lakes to the red region, and leave Genesee, Wyoming, Livingston, Ontario, Yates, Seneca, Cayugo, and Onondaga (pink). |
| Northern Cayuga County is more comparable to Oswego COuny than it is to Southern Cayuga County   |
| Is Westchester really in the same climate zone as Saratoga? Shouldn't there be lower and upper Hudson Valley zones?  |
| Long Island without NYC  |
| Your regions do not conform with REDC regions or tourism regions? Why?   |
| seems odd that the Hudson is the dividing line. Our weather is so different from capital region, but we're in a different region than our neighboring city 5 mins away.  |
| A separate regions for the Finger Lakes.   |
| Region 5 is too large and spread-out - please separate out NYC bc what we're experiencing is very different even from Westchester  |
| Create interstate planning regions - very useful when there are shared floodsheds/watersheds   |
| NY   |

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| <p><b>The map below shows the seven climate regions of New York State used in the prior ClimAID Reports. Is there anything you would change about these regions for the next ClimAID Report?</b><br/> <b>- Yes, I would change the regions (please specify what you would change)</b><br/> <b>(continued)</b></p>  |
| <p>Combine suburbanized/urbanized Hudson Valley on east and west of Hudson (e.g. putnam and Westchester have much more in common with Orange and Rockland than they do with Washington, Rensselaer and Mohawk valley)</p>  |
| <p>I would add rockland and westchester to NYC , maybe make long island its own region</p>   |
| <p>Combine Columbia Co south with Region 2</p>   |
| <p>The NYS Climate regions map delineating 7 climate regions should be re-evaluated. For example, it is challenging to understand how Herkimer County and Westchester County are part of one climate region. Northern Herkimer County, which includes Old Forge, has an average minimum temperature of -30.9F while White Plains in Westchester County boasts a minimum average temperature of +0.5F. Herkimer's USDA Plant Hardiness Zone is 3b with a 97-day long average growing season, while the White Plains' (USDA Plant Hardiness zone 6-7) growing season is on average 227 days long. From a grower's perspective, these two locations are on the opposites of plant hardiness zones. Just considering USDA Plant Hardiness Zones, climatic differences within just one region described in the 2011 report are substantial and potentially limit their application. Consider a separate climate zone for Westchester, Dutchess and Putnam Counties, or revisit the entire regional allocations.</p> |
| <p>scale down further; separate coastal zones that will be influenced by coastal storms/flooding</p>   |
| <p>Dissagregate E Hudson from Cap Reg-Mohawak</p>  |
| <p>I don't agree with these regions as is, but without knowing what they are based on I cannot comment. Land use patterns across these regions vary widely, and Cattaraugus Creek flows into Lake Erie - should that not be in the Great Lakes Region? These are also not aligned with the State's FRegional Economic Development Regions...how are the regions defined?</p>   |
| <p>Based on the work of Dr. Stephen Vermette, I would divide the Western New York into coastal, plain and hilly areas - since past climate trends differ between them</p>  |
| <p>Cattaraugus belongs in WNY more than Finger Lakes</p>   |
| <p><b>Please provide any additional comments or suggestions you have regarding the next statewide climate assessment.</b></p>  |
| <p>Have a chapter on the built environment and/or buildings!</p>   |
| <p>Please clearly focus on identifying and gearing policy toward creating tangible benefits - cost savings and economic growth potential - to rural, upstate communities if they choose to engage in climate mitigation, adaptation, and resilience efforts. Frame the language in terms of disaster risk reduction and use appropriate messaging to appeal to inland, rural communities in order to reduce the probability that they view climate change as a predominantly coastal issue.</p>  |
| <p>No Comment. Thanks for your comitment!</p>  |
| <p>consider moving beyond NY's borders. for PANYNJ, consistent information for full port district (25 mile radius from status of liberty) would be valuable</p>  |
| <p>Please consider adaptive capacity/general resilience, not just specified resilience or climate impacts in isolation.</p>  |
| <p>So excited that you plan on updating this. Climate change will significantly change NYS in the years to come. While it is hard to project the economic impacts, this needs to be raised. How can we provide data for those who really want to dig in, but broad, scientifically based education for the public.</p>   |
| <p>make planning for climate change an epressed requirement ("element and/or chapter heading")all regs and muncipal planning regulator documents</p>   |
| <p>Rather than use geopolitical boundaries is there a way the regions can be separated by geographic/climatic boundaries?</p>  |
| <p>Please add a chapter on impacts on buildings. I was on the team that authored reports to fill in this "gap" in ClimAid, but it would be better to have it included in the next installment itself.</p>  |
| <p>Would like to see more comprehensive and up-to-date review of public health adaptations associated with climate change; Looking forward to seeing it!</p>   |
| <p>I found this survey frustrating in that I could not select multiole, and in some cases, the answer (esp on what projections are of use, etc) is truly "it depends on the project or the audience". We need all this info, and the whole point of addressing climate change is we all have to do to achieve zero ZNE, and that "do" will be different for each situation, and the needed data will be differnet for each client/situation.</p>   |

| <b>Please provide any additional comments or suggestions you have regarding the next statewide climate assessment (continued)</b>  |
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| None   |
| Good luck and get the word out when you have data through the GIS Clearinghouse  |
| needs much more of a social and environmental justice focus (chapters not aside mentions)  |
| Sorry I was not aware of it before.  |
| None   |
| None   |
| Interactive maps with layers that can be turned on and off over aerial base maps would be a good interface.  |
| I'd suggest having regional discussions when you roll out the new report and allow groups to ask questions of experts who can assist them in determining how to move forward using the report and the data.  |
| Thank you. Please continue to engage with users in the design and process.   |
| Thank you for the work that you are doing - NYS should be a leader, but need to have more work across states!  |
| More dissemination of the report to other agencies and local governments.  |
| Please don't be "recurrence interval centric" please share recurrence intervals, probability or probability distributions  |
| Identifying gaps in climate change education would be really helpful. Looking at the best ways and strategies for communicating about climate change is through people's stories and examples (both of impacts and solutions); a suite of short video case studies of solutions working in different regions; I would love to have a conversation about this question!!  |
| Make staff available or pre-made slides that can be used easily with the public--a library of charts and graphs or slide that anyone can use. A speaker's bureau that can go around the state. Could be a corps of young people trained to deliver the content. It needs to be in print and also widely available in other ways. Take a lesson from Al Gore. The Wild Center can help with this--we can train the army of young people in each region.   |
| Looking forward to it!! Maybe funding opportunities aimed at planning and adaptation would be a helpful resource.  |
| Please include climate education (and teacher preparation) in future updates (see <a href="https://news.un.org/en/story/2019/12/1053261">https://news.un.org/en/story/2019/12/1053261</a> ). It's vital that children become climate literate as soon as possible and that we recognize climate impacts on our youth and the most vulnerable populations. In addition, please shorten length of reports, and ensure that they present data and information in digestible formats that are accessible by the general public. Infographics and/or story maps would be helpful.   |
| <p>General comments:</p> <ul style="list-style-type: none"> <li>• The 2011 ClimAID report reads like a technical document. Despite efforts to highlight important information in summaries for policymakers, it is important to also communicate the information to the general public. In order to facilitate public understanding, greater use of visuals/graphics for data, trends and climate impacts should be expanded including the use of a variety of technologies.</li> <li>• Include any measurable changes in trends of impacts since the last publication. Communicating Probability of Occurrence</li> <li>• The 2011 report uses expressions for "Likelihood of Occurrence" (ClimAID page 441) may potentially lead the public to undervalue the probability of occurrence. A greater than 95% probability is assigned an "extremely likely" description and a 50% or greater is assigned "more likely than not". Meteorologists forecast rain if there is a greater than 50% probability. People generally prepare and carry umbrellas for 50% risk rain. Recommend to re-imagine the "likelihood expressions" and utilize terms that convey the value of that risk. Consider simply communicating the percentage numbers (50% chance to happen/occur, 95% chance to occur, etc.) without the likelihood of occurrence expressions.</li> </ul> <p>Crosswalk GHG Mitigation and Adaptation Actions and Co-Benefits:</p> <ul style="list-style-type: none"> <li>• There is a nexus between climate adaptation, climate impacts and mitigation activities. Recommend that a crosswalk of GHG mitigation and adaptation also include co-benefits, or negative impacts. For example, if actions to reduce greenhouse gases also reduce ozone and other air quality pollutants, co-benefits such as reduced respiratory health risks should be highlighted. In this example, please note that NY City is a non-attainment area for ozone standards and actions that would also reduce ozone would provide significant public health benefits. Again, figures and graphics are key so that the public can better understand this nexus. Public Health</li> <li>• One area to highlight for public interest is Public Health. The 2011 Public Health Chapter describes many studies along with references. However, there are very few graphs and figures to illustrate the studies. Topics that should</li> </ul> |

be highlighted for public interest may include asthma and respiratory illnesses and how these relate to climate change, vector diseases, changes in pollen distribution, change in ozone and other air pollutants due to climate change, specific issues for urban and rural environments. All these topics should be illustrated by use of figures and graphics highlighting trends along with impacts to health. If projections can reasonably be made for factors such as allergens and ozone and potential health impacts, these should be included as well. If available, include potential future peaks of climate change and air quality related issues and how these may impact public health.

- Climate change and impacts to public health: Provide a clear nexus between air quality and climate change. Identify co-benefits of addressing climate change by quantifying impacts by GHG emission scenarios. Also recommend including projections on future climate change induced air quality issues.

#### Coastal Zones

- The 2011 ClimAID recommendations (p 122) included that climate change impacts to the Great Lakes region should be assessed. Since 2011, the Great Lakes area has experienced multiple flooding events underscoring the need to investigate impacts, and project future conditions that also includes contributing precipitation from out-of-state and wind driven coastal flooding.

- The 2011 ClimAID report was published before some major flooding events, in particular Hurricane Sandy (October 2012). Flooding depths and extent of this event should be utilized as a reference as it has been and will in all likelihood continue to be a major catalyst for resiliency action for coastal areas including heeding evacuation orders.

- Coastal Storm Forecasts: According to the ClimAID report, 85% of coastal storms forecasted, did not materialize (p128). The National Hurricane Center (NHC) has improved intensity and tracking forecasting since Hurricane Sandy. New experimental forecasting software is increasing the forecast window to 6-7 days instead of 5 days ahead of the storm. Implementation of newer models should be evaluated for NYS use. More accurate forecasts and consequently, less inaccurate forecasts, would help prevent economic losses from unnecessary closures and evacuations. Similarly, new storm surge inundation models developed should be considered to improve flood depths and extent.

- Any sea level rise projection figures should always include a reference baseline. For example, page 125 of the ClimAID report does not include a reference baseline.

- Saltwater marsh loss mitigation. Some coastal marshlands have undergone significant losses. Recommend including techniques that may improve marsh health and stability. Consider examining the filling of “mosquito ditches” and utility trenches to fortify the core of the marshland islands.

- Beach erosion magnitude/history. It would be good to assess how beaches are moving over time.

- Recommend evaluating potential changes in wind speeds and direction. This in turn may impact coastal erosion concerns. Would prevailing winds coming at Long Island from the Southeast be greater in magnitude and thereby cause more coastal erosion than winds from the Northeast? If this is a projected change, some beaches would benefit from proactive armoring to prevent severe erosion. Concerns with changing wind speeds and direction also apply to the Great Lakes region. • Coastal adaptation strategies should consider retrofitting backflow preventers to stormwater drainage systems for in low lying areas (p130). Ecosystems and Agriculture • NYS appears to be near the epicenter of invasive species spreading through the US (2011 map p169). First, practicable strategies to stem the flow of invasive species need to be identified with rising temperatures favoring the spread for many invasives. In addition, plant species that can tolerate future conditions need to be identified to support a migration of species due to the changing climate. As part of this effort, the discussion should include what makes a species a “suitable native”, or which hybrids are suitable substitutes for natives. How can the state best prepare for future flora and fauna with a changing climate? Should this include preparation of suitable habitat? How should the use of “native” trees, shrubs, forbs and grasses for a future warmer climate be sustainably cultivated? What does a palette of resilient plantings include? Although stands of ash, elm, and chestnut trees have been decimated, should the state reintroduce these species to re-establish these at scale?

- The invasive species portion of this chapter needs to be updated due to numerous newly introductions of invasive species such as a spotted lanternfly.

- The 2011 report requested restored legal protection for isolated wetlands. Has this been accomplished in NYS?

- Eco-System issues involve a large group of stakeholders, which could amplify the need to publish best management practices on this topic.

#### Transportation

- Ferries have become a significant part of the downstate transportation mix and should be included in evaluations. Ferry service served otherwise stranded communities after Hybrid Storm Sandy and services have been expanded since.

#### Adaptation Strategies and Landuse

- Following Hurricane Irene, TS Lee and Hybrid Storm Sandy, NYS invested in more resilient communities. Going forward, it would be helpful, to identify whether decisions at the local level are taking resiliency into greater account since these events. Are local decisions and actions taking into account reductions of flood risk? The GOSR

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| <p>Community Reconstruction Program could be highlighted including an analysis of its successes and existing needs. Publish Best Management Practices</p> <ul style="list-style-type: none"> <li>• applicable and practical for all types of actions for all levels of government, private entities and the public. GHG Mitigation/Carbon Sequestration</li> <li>• Agriculture (rural an</li> </ul>   |
| <p>the report should include cost information on NOT mitigating the climate change; also more emphasis on climate mitigation and less on climate adaptation; also a clear section on 'social cost of carbon" and how this cost is realted to various mitigation strategies</p>  |
| <p>I hope the report will be a toll to inform decision makers about why they need to act, and understand how the changing energy landscape in NYS will impact their communities.</p>  |
| <p>I would like to see a discussion of present and proposed policy actions in relation to modelling projections of climate-induced impacts, and a discussion of how the use of policy options reflects differences in projected climate impacts between regions</p>   |
| <p>In general, I feel that most decision-makers in NYS understand that climate change is happening &amp; that it will have severe impacts. What would be great are concrete examples (e.g., specific projects/programs) of ways NYS can adapt to or mitigate climate change impacts and if possible, which ones are successful and why.</p>   |
| <p>thanks</p>   |
| <p><b>The research team would like to distribute this survey widely across New York State. Please list any organizations or individuals that are current or potential users of climate information in the State that should receive this survey.</b> [All references to personal contact information have been omitted]</p>   |
| <p>American Society of Adaptation Professionals, GLISA at the University of Michigan</p>  |
| <p>Paleontological Research Institution; Wild Center; all county-based Environmental Management Councils; Cornell Cooperative Extension - Community &amp; Energy Program Work Team; New York State Water Resources Institute; New York State Clean Energy for Agriculture Task Force; all active NYSDEC Climate Smart Communities local committees or task forces; CaRDI, UBRI, all regional planning and development boards and County planning departments; Soil and Water Conservation Districts</p> |
| <p>farmers/NY Farm Bureau/Soil and Waters</p>   |
| <p>I am sharing already</p>   |
| <p>Cornell University, Westchester County Government, Local municipalities, the Green Industry in general through the New York State Turf nd Landscape Association.</p>   |
| <p>To all.</p>  |
| <p>NYS Floodplain and Stormwater Managers Association</p>   |
| <p>American Society of Adaptation Professionals</p>   |
| <p>I have been passing it along to everyone.</p>  |
| <p>NYS Parks (their master planning docs) also visitor information/interpretive exhibits</p>  |
| <p>Architects and Engineers</p>   |
| <p>NESEA, USGBC, ILFI, municiplaties, and educational institutions - maybe sharing with NYCHE and more...</p>   |
| <p>Consultants who are hired to prepare hazard mitigation plans for municipalities - for example, TetraTech</p>   |
| <p>NYSGISA, GIS/SIG; I got this through the NYS County Planners directors list serve. You could add the Upstate APA</p>   |
| <p>Sustainable Saratoga</p>   |
| <p>All universities; all local governments; all NY state agencies; National Guard; tribal governments; Chambers of commerce; federal land management agencies in NYS; public school districts/schools; hospitals; all environmental nonprofits; churches/synagogues/temples; unions</p>   |
| <p>Dutchess County Climate Smart Communities Task Force</p>   |
| <p>Regional planning and county planners</p>  |
| <p>Tompkins County Climate Protection Initiative, Cooperative Extension, City of Ithaca and Town of Ithaca, The Wild Center</p>   |
| <p>LI Clean Energy Leadership Task Force</p>  |



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| The Nature Conservancy, NYS Dept. Agriculture and Markets, NYS Division of Homeland Security and Emergency Services, NYS Dept. of State  |
| City of Ithaca   |
| Sciencenter, Tompkins County Environmental Management Council, PRI/Museum of the Earth   |
| OGS Design & Construction, Department of Corrections and Community Supervision   |
| NY Sea Grant, County Soil and Water Conservation districts, Save The River, Eastern Lake Ontario Dune Coalition, Adirondack Watershed Institute, Tug Hill Commission, County Planners, Regional Planning Councils, Lake Associations, American Farmland Trust, and the Farm Bureau   |
| Regional planning councils (e.g., CDRPC, HVRC CNYRPDB, etc.)   |
| Empire State Forest Products Assoc, Society of American Foresters  |
| International Code Council, NYSBOC   |
| <b>The research team would like to distribute this survey widely across New York State. Please list any organizations or individuals that are current or potential users of climate information in the State that should receive this survey.</b> [All references to personal contact information have been omitted]   |
| NYC office of resilience, NYC office of sustainability, NJ EDC, NJ BPU,  |
| NYS Dept of Education, NYC Dept of Education, Haudenosaunee Climate Task Force, Museum Association of NYS, STANYS (Science Teacher Association of New York State), NYSOEA - New York State Outdoor Educator Association, AZA - American Zoo and Aquarium Association and ASTC - Association of Science & Technology Centers (you can segment to NYS), Cornell Cooperative Extension, Adirondack Association of Towns & Villages, Finger Lakes Institute, Center for Native People and the Environment at SUNY ESF, |
| science teachers   |
| Local planning boards, etc.  |
| NYC Department of Education  |
| The Wild Center's Adirondack Youth Climate Program, Cornell Cooperative Extension  |
| USGS; USDA - Plant hardiness experts.  |
| Designing to Live Sustainably ( <a href="https://d2ls.org/">https://d2ls.org/</a> ) and NY Sea Grant   |
| NYDEC, NYDOH; also distribute to neighboring states, federal agencies (EPA, DOE, DOI)  |
| Please use NYSERDA's distribution lists for local governments and community based organizations  |
| RENEW Institute, University at Buffalo; UB Sustainability (and UB generally); Designing to Live Sustainably  |
| NYC Department of Parks & Recreation, NYC Department of City Planning, NYC Department of Health and Mental Hygiene, NYC Mayors Office of Resilience, Natural Areas Conservancy   |



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**New York State  
Energy Research and  
Development Authority**

17 Columbia Circle  
Albany, NY 12203-6399

**toll free:** 866-NYSERDA  
**local:** 518-862-1090  
**fax:** 518-862-1091

[info@nyserdera.ny.gov](mailto:info@nyserdera.ny.gov)  
[nyserdera.ny.gov](http://nyserdera.ny.gov)



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