

SOUTHERN U.S. REGIONAL HAZARDS AND CLIMATE CHANGE PLANNING ASSESSMENT

*A summary report based on a regional survey conducted by the
Southern Climate Impacts Planning Program (SCIPP)*

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SCIPP

Southern Climate Impacts Planning Program

1. ABOUT THE SOUTHERN CLIMATE IMPACTS PLANNING PROGRAM

The Southern Climate Impacts Planning Program (SCIPP) is a National Oceanic and Atmospheric Administration (NOAA) Regional Integrated Sciences and Assessments (RISA) program serving the climate research and information needs of the south-central United States. Established in August 2008, SCIPP is a joint research program of the University of Oklahoma (OU) and Louisiana State University (LSU) with combined expertise provided through the Oklahoma Climatological Survey, Louisiana Office of State Climatology, Department of Geography and Anthropology at LSU, Southern Regional Climate Center (SRCC) at LSU, and National Weather Center at OU. The area of focus for SCIPP is the 6-state region including Oklahoma, Texas, Arkansas, Louisiana, Tennessee, and Mississippi; this same region corresponds to the operational area of responsibility for the SRCC thus creating a unique collaborative opportunity between research and operations.



Figure 1. Region covered by the Southern Climate Impacts Planning Program with lead research institutions denoted.

RISA is a unique stakeholder-driven research and engagement program that focuses on regional climate issues across the United States through a collection of university-based research programs. Each RISA team focuses on climate issues inherent to the local region as identified through interaction between local and regional decision makers and each team. Through this interaction, scientists gain a greater understanding of the information and research needs of the suite of decision-makers in their region which in turn leads to more relevant research, the development of practical information products and tools, and the establishment of suitable educational materials and training tools.

As RISA's south-central U.S. program, SCIPP concentrates on several climate issues critical across this region, including multi-hazard planning (severe storms, drought, flooding, hurricanes, extreme temperatures, etc.), coastal impacts, and climate adaptation planning. SCIPP addresses these issues through building relationships with regional decision makers, conducting pertinent and regionally relevant scientific research, and providing critical information, products, tools, and education. For more information about SCIPP visit the program website at www.southernclimate.org.

2. STUDY OVERVIEW

As one of the first major SCIPP research projects, the goal of this particular study was to better understand local and regional hazard planning across the Southern U.S., specifically from the perspective of those involved with developing plans. A review of Federal Emergency Management Agency (FEMA) disaster information illustrates that states throughout the SCIPP region are among the most disaster affected areas of the country (see Table 1). FEMA disaster declarations include hazards such as severe storms, hurricanes, severe ice storms, fires, floods, snow, tornadoes, coastal storms, freezes, and other hazards – all of which impact SCIPP states to varying degrees. Drought is also a major regional contributor to hazards, although this

particular hazard is not represented in FEMA data since drought is the responsibility of the U.S. Department of Agriculture.

Rank	State	No. of Disasters Declared
1	Texas	83
2	California	76
3	Oklahoma	65
4	Florida	63
5	New York	60
6	Louisiana	56
7	Alabama	54
8	Kentucky	52
9	Arkansas	51
10	Missouri	49
11	Mississippi	48
11	Illinois	48
13	West Virginia	46
14	Kansas	44
14	Minnesota	44
14	Nebraska	44
14	Ohio	44
14	Tennessee	44

Table 1. FEMA disaster declarations through July 19, 2010. SCIPP states are highlighted in green.

While hazards are certainly not the only regionally relevant climate issue across the south (other issues include and are not limited to water resources, agricultural, ecosystem preservation, health, energy, transportation, etc.), it is one in which a dense network of planning and decision making entities exist region-wide, thus providing an excellent resource of critical regional stakeholders with valuable insight. Due to this community's role in planning for hazards both now and in the future (in conjunction with a changing climate), the involvement of these critical decision-makers in this study and future efforts is incredibly important.

FOCUSES OF THE SURVEY

While weather and climate-related hazards served as the common theme for this particular study, focus was not limited to past hazards. The survey included three main sections with emphasis placed on: 1) hazard planning, 2) climate change planning, 3) and information use and needs. Hazard planning represented the first major survey topic and was included to obtain key information on hazards perception and how these perceptions vary geographically. Next, climate change and related planning was included for the purposes of quantifying perceptions of climate change, evaluating anticipated changes in hazards in conjunction with a changing climate, and determining climate change planning challenges and needs. The third and final section on information use and needs was incorporated into the study to gauge the types of information sources used in hazard planning, determine the utility of information products to users, and finally identify the greatest information needs for planning purposes. Each of the sections helped to identify the following types of information:

HAZARD PLANNING

- Identify regionalized differences in hazard planning priorities – What matters where?
- Learn the network of partners contributing to hazard planning – Who/what is key to the process?
- Reveal the most significant barriers in hazard planning – What hinders your ability to plan for hazards?

CLIMATE CHANGE

- Evaluate climate change perceptions – How concerned are you?
- Quantify potential climate change impacts – What impacts are concerning (or not) in your area?
- Discover climate change-related planning activities occurring regionally – What is your community already doing?
- Diagnose climate change planning hurdles – What factors limit your ability to incorporate climate change into the planning process?

INFORMATION USE AND NEEDS

- Determine data and information sources used in hazard and climate planning – What sources of information are indispensable?
- Assess gaps in data and information – What information, training, etc. is missing that would improve planning and preparedness?
- Develop a growing list of regional contacts interested in working with SCIPP on these issues and further projects.

The answers to these questions serve as a guide for future SCIPP engagement and research efforts while also serving as a record of decision-maker perceptions and needs during the earlier years of the program. A full list of survey questions is included in the appendix.

DEVELOPMENT AND DISTRIBUTION OF THE SURVEY

The SCIPP regional hazards and climate change planning survey was developed during the spring and summer of 2009 through a comprehensive review of hazard and climate change-related surveys administered elsewhere across the U.S. Survey questions were developed through a combination of originally developed material and a synthesis of questions from other studies that were adapted as appropriate. Material from other surveys included two hazard and communication surveys (Meo et al. 2002; Oregon 2008) as well as a climate change perceptions, impacts, and planning survey (Moser and Tribbia 2006).

Survey development was accomplished through an iterative review process that involved members of the research team as well as a pre-test group. Following a thorough review of the survey, pre-testing was conducted during July of 2009 and was accomplished through the University of Oklahoma Center for Risk and Crisis Management's Community Advisory Board (CAB). The CAB is comprised of a collection of local- and state-level stakeholders representing a variety of organizations including emergency management, public health, city planners, utility providers, municipal government, and various other groups. A total of 21 CAB members participated in the pre-test and provided detailed feedback on the content, length, and utility of the survey content. Based on their responses, survey content was reduced by 25%, questions were shortened to reduce fatigue, and material was further organized.

The final product of the development process was a 50-question, 30-minute electronic survey which was administered through the popular survey website SurveyMonkey (www.surveymonkey.com). Participation was completely voluntary and anonymous with approval provided through an Institutional Review Board (IRB) consent form at the beginning of the survey. Following the survey, each participant was routed to an external website where they were given an option to provide contact information for the purposes of obtaining survey results and participating in future projects with SCIPP.

The audience of interest for this particular study are those most closely involved with the hazard planning process. Such groups included: emergency management officials, city officials, local-level hazard planners, members of regional planning districts and related entities across the region (which also included development districts and councils of government), planning consultants, and public works specialists. Contacts were sought for each city, county/parish, and tribal entity listed in the Federal Emergency Management Association (FEMA) Hazard Mitigation Plan status list available on the FEMA website (<http://www.fema.gov/library/viewRecord.do?id=3571>; available as of March 26, 2010). This comprehensive search yielded a contact list of more than 2,000 decision-makers across SCIPP's 6-state region. Survey distribution occurred over a 2-month period from mid-October to late December 2009 through a series of mass emails. In addition to SCIPP sending out invitations to participate in the study, partners at the FEMA Region 6 office as well as the National Weather Service's Southern Region Headquarters also distributed the invitation throughout their agencies to disseminate the survey to decision-makers within their networks.

Figure 2 (right). The front entry page for the hazards and climate change planning survey.



3. RESULTS

This section provides a summary of the results of the regional hazards and climate change planning survey. While information was collected on all 50 questions, results will be presented for a selection of questions highlighting the most important results.

SUMMARY OF DEMOGRAPHICS

A total of 278 decision-makers participated in the regional survey representing perspectives from across the 6-state SCIPP region of Oklahoma, Texas, Arkansas, Louisiana, Tennessee, and Mississippi (additional participants from other states were welcome to participate as well). 197 out of 278 participants completed the survey in full which represented a completion rate of 70.9%. The state-by-state breakdown of survey participants was as follows with percentage of participants by state shown in parentheses (not all participants chose to answer this question):

- Texas – 96 participants (36.2%)
- Oklahoma – 53 participants (20.0%)
- Louisiana – 48 participants (18.1%)
- Arkansas – 27 participants (10.2%)
- Tennessee – 26 participants (9.8%)
- Mississippi – 14 participants (5.3%)
- Alabama – 1 participant (0.4%)

Geographically, regional participation was fairly consistent (Fig. 3) with large urban centers accounting for the highest concentrations of survey participation, particularly in New Orleans, LA, Dallas/Ft. Worth, TX, and Oklahoma City, OK.

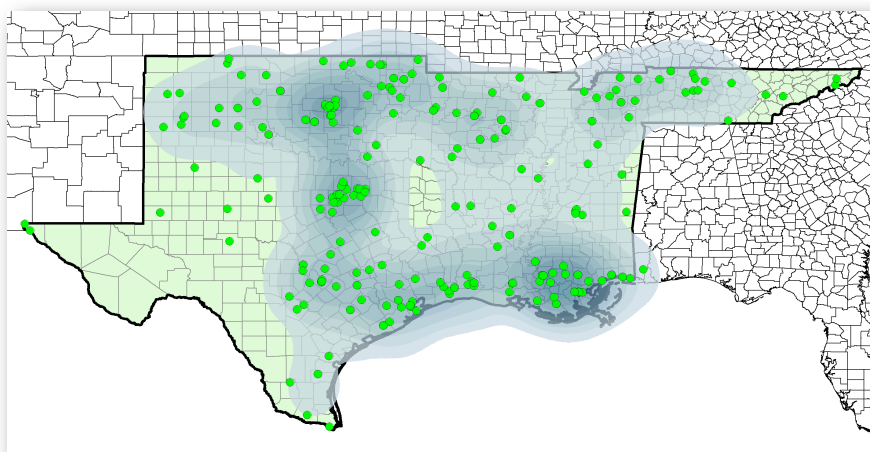


Figure 3. Regional participation in the SCIPP hazard and climate change planning survey. Each green dot represents the location of a single survey participant as provided by zip code. The shaded colors represent the geographic clustering of participants with darker blues indicating higher concentrations of survey participants.

Participants were predominantly Caucasian (92%) and male (76%) with an average age of 51.5 years. In addition, participants came from very strong educational backgrounds with more than 96% (254 of 263) having attended college or completed degrees. The employment makeup of

the participants included a mixture of professions with emergency service managers, city and regional planners, elected officials, police & fire personnel, and environmental specialists comprising the majority of those taking the survey. Of those taking the survey, 84.4% indicated that they are involved in some capacity in the hazard planning process. Roughly half of the participants have responsibilities at the community (50.4%) or county (47%) levels while fewer work at the state (18%) or multi-county (16.5%) level (Note: participants could select more than 1 level of responsibility). 64% indicated that their offices have 2 or fewer staff members devoted to hazard planning responsibilities for their respective areas. Nearly 70% of the participants indicated that their areas of responsibility have populations of fewer than 100,000 people.

HAZARD PLANNING RESULTS

To begin this section participants were asked to rate the level of importance of a series of climate hazards (which can be defined as any recurring weather-related hazard) as each of these currently affect their community. Hazards included droughts, wildfires, dust storms, hurricanes, storm surge, flood (from rain or rivers), inundation (from sea-level rise and/or land subsidence), windstorms, hail, tornadoes, lightning, heat waves, extreme cold, and severe winter storms. The question was included to reveal the perceived level of importance of all hazards by location. Participants rated each of the hazards from as high as 4 (critically important) to as low as 0 (not important at all).

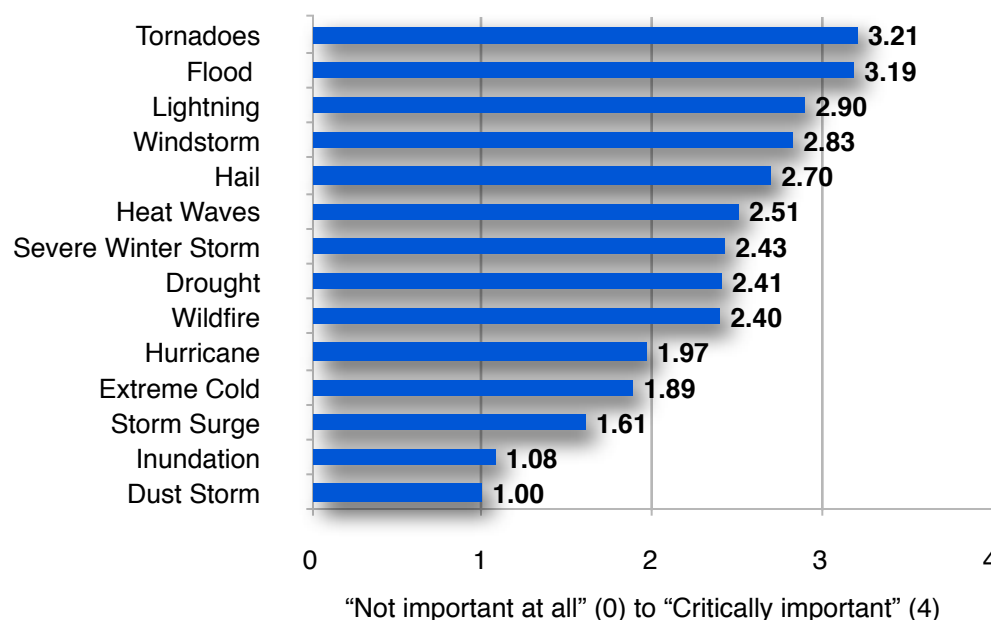


Figure 4. Average ratings for each hazard (all states across SCIPP region). Ratings ranged from “critically important” (4) to “not important at all” (0).

Tornadoes received the highest average rating of all hazards at 3.21 (Fig. 4). Floods followed just after tornadoes with an overall rating of 3.19 thus signifying the region-wide importance of flooding in local hazard planning. Numerous storm-related hazards followed next (including lightning, windstorms, and hail) as depicted in Fig. 4. In the next cluster down were several similarly themed hazards including heat waves, droughts, and wildfires (as well as severe winter storms) which received ratings at or just below 2.5 across the region. The remaining hazards – hurricanes, extreme cold, storm surge, inundation, and dust storms – received the lowest

average ratings, primarily due to the location-specific nature of many of these hazards. To better reveal the variations within the region, hazards were broken down by state as shown in Figs. 5 and 6.

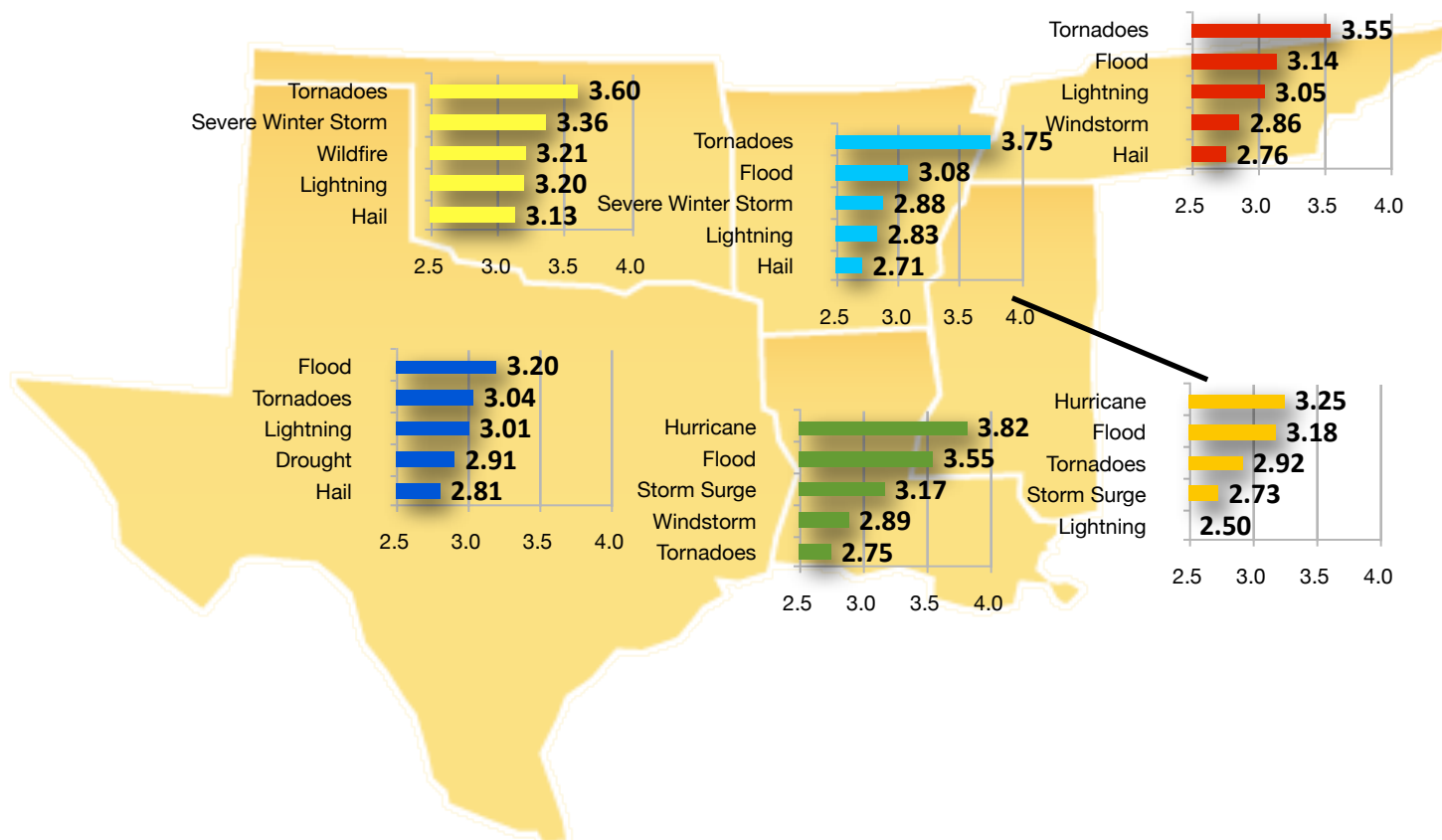


Figure 5. The top 5 rated climate hazards as broken down by state. Numbers represent the average rating (which ranged from 0 to 4, with 4 being the most critical) given for each hazard. Participation by state was as follows: TX - 92, OK - 48, LA - 44, AR - 25, TN - 22, MS - 12.

In terms of commonalities across the region, tornadoes were one of the most frequently top-rated hazard in the region. In fact, tornadoes appeared in the top 5 hazards for each state in the region and were most prominent in the northern-tier of SCIPP states, as well as Texas. Similarly, flooding was widely identified as a critical hazard across the south with most states rating it in the top 1 or 2. The most notable outlier was Oklahoma which rated floods a bit lower at number 6. Lightning was another frequent hazard on the list and appeared in all top 5's except for Louisiana. In addition to lightning, hail was fairly common across the region, and was most pronounced in the interior states (Oklahoma, Arkansas, and Tennessee) as well as Texas.

Taking a closer look at some of the regional variations in climate hazards, Louisiana and Mississippi rated hydrologic-related hazards very high, including hurricanes - which topped each state's rankings - and storm surge. Hurricanes did not appear as a top 5 hazard in Texas primarily due to the large variation in hazard priorities across the state and greater number of respondents from interior areas such as the Dallas/Fort Worth and Austin (hurricanes rated 10th overall in TX). Severe winter storms were high on the list in both Oklahoma and Arkansas,

which have both suffered from crippling ice storms and snowstorms in recent years. Other notable findings included a top 5 rating for droughts in Texas, which is likely attributed to a severe drought that occurred across much of the state during 2008-2009 before this study was conducted. No other state had droughts rated any higher than 8. Oklahoma rated wildfires higher than any other state, which much like Texas, is likely due to a recent series of fires in the state in 2009 prior to the study.

A further depiction of hazard ratings by type and state is illustrated in Figure 6, which shows higher ratings farther from the center of the chart.

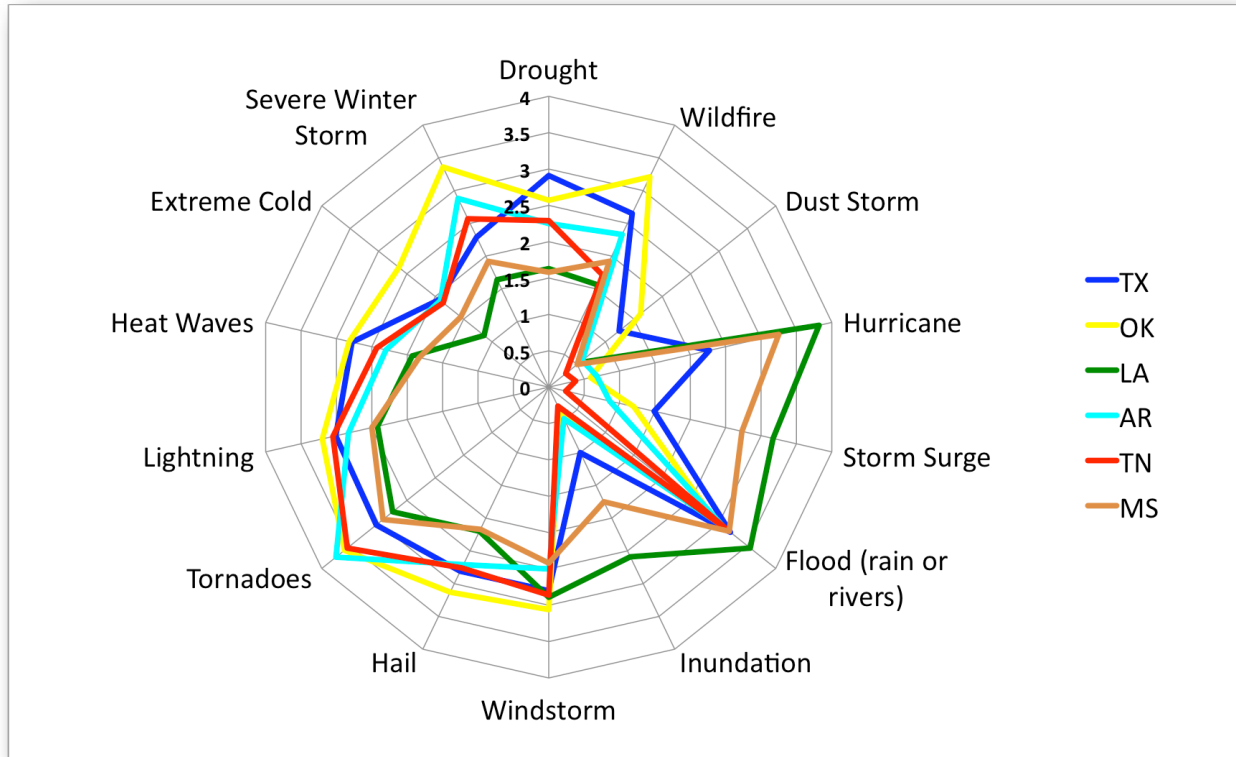


Figure 6. The average rating for each climate hazard as broken down by state. Higher numbers (lines farther from the center) are associated with more critical hazards. Results are shown for each hazard and are broken down by state.

Figure 7 illustrates the percentage of survey respondents with any form of hazard related plans (such as hazard mitigation plans, response plans, or other related plans). In general, the existence of plans matches up well with the ranked level of importance of each hazard, as shown in Fig. 4. Flood and tornadoes topped the list with the largest availability of hazard plans at more than 80% of those participating in the survey. Wildfires, windstorms, severe winter storms, lightning, and hail were present in more than 60% of the participant's plans. Notably, Wildfire - which was only ranked as the ninth most significant hazard regionally - was the third most planned hazard at 70.7% of all participants. Next down were drought, heat waves, extreme cold, and hurricanes which were present in more than 50% of survey participant's plans. At the bottom of the list were storm surge, inundation, and dust storms which is not surprising given the more local nature of several of these phenomena (storm surge and inundation) as well as the relatively infrequent nature of dust storms.

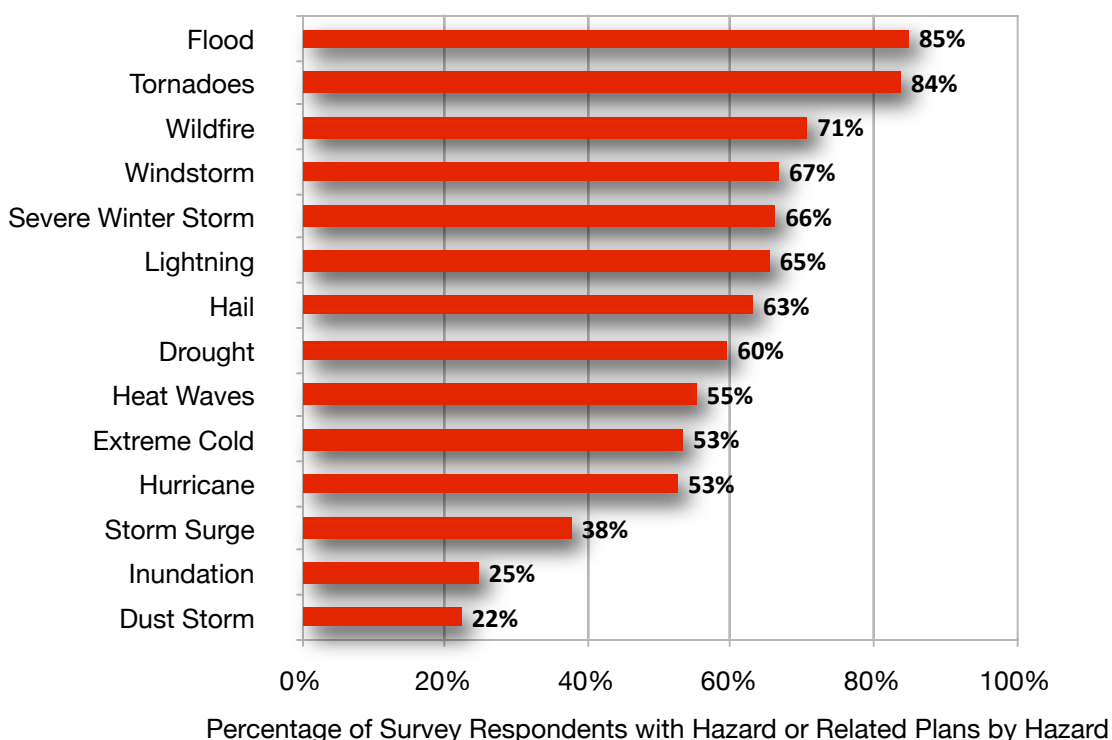


Figure 7. The percentage of survey respondents with developed hazard mitigation plans, response plans, or other related plans.

Other hazard plans mentioned by survey participants included community plans, water conservation plans, comprehensive emergency management plans, emergency operation plans, state/region/county plans, and contingency plans.

The survey revealed that a significant amount of collaboration occurs in conjunction with hazard planning at a variety of levels. At the local level, hazard planners interact with a variety of organizations, agencies, and groups. According to the study, the most frequent interactions occurred with public safety agencies, public works officials, county/parish officials, and councils of government (Table 3). Survey participants could also provide additional answers as pertinent. The most common responses from this optional question included local emergency planning committees (LEPC) and tribal groups.

Local-level Organizations	Percent of Respondents
Public Safety Agencies	77.9%
Public Works	77.0%
County / Parish Commissioners or Township Officials	69.9%
Association of City / Council Governments	66.8%
Other Citizen Groups	38.1%
Industry	37.6%
Economic Development Coalition or Agency	36.3%
Chamber of Commerce	35.0%
Consultant(s)	33.2%
Developers	25.2%
Small Businesses	24.8%
Scientists/Engineers	23.9%
Rural Development	23.0%
Environmental Advocacy Groups	22.6%
Homeowner Associations	21.7%
Other	12.8%
Local Land Trust	7.1%

Table 3. Percent of survey respondents to interact with organizations at the local level in conjunction with hazard planning (N=226).

State and regional-level coordination was also found to be significant, particularly with state departments of emergency management, environmental quality, and health (Table 4). Somewhat surprising was the relatively infrequent level of involvement with state climate offices (24.3%) which commonly provide historical weather and climate hazard information required for hazard plans. State-by-state differences in climate offices (for instance, Tennessee does not currently have a state climate office) may have some bearing on this result.

State/Regional-level Organizations	Percent of Respondents
State Department of Emergency Management	91.3%
State Department of Environment Quality	67.4%
State Department of Health	66.1%
State Department of Agriculture	39.0%
State Water Board	33.0%
State Department of Wildlife Conservation	32.1%
State Municipal League	26.1%
State Climate Office/Regional Climate Center	24.3%
State Conservation Commission	21.6%
State Farm Service Agency	17.9%
State Corporation Commission	9.2%
Other	6.4%

Table 4. Percent of survey respondents to interact with organizations at the state/regional level in conjunction with hazard planning (N=218).

The survey also identified several federal organizations commonly utilized in conjunction with hazard planning, including FEMA, the National Weather Service, and the Army Corps of Engineers (Table 5). Also notable were answers to the optional “other” question, which commonly included the Environmental Protection Agency.

Federal-level Organizations	Percent of Respondents
Federal Emergency Management Agency	82.3%
National Weather Service	71.3%
U.S. Army Corps of Engineers	55.0%
National Oceanic and Atmospheric Administration	40.7%
U.S. Department of Agriculture	33.5%
U.S. Geological Survey	29.2%
U.S. Department of Health and Human Services	28.2%
U.S. Fish and Wildlife Service	22.0%
U.S. Department of Defense	22.0%
U.S. Department of Housing and Urban Development	19.1%
USDA Emergency Board (County)	15.3%
U.S. Bureau of Reclamation	9.6%
USDA Emergency Board (State)	9.1%
Other	5.7%

Table 5. Percent of survey respondents to interact with organizations at the federal level in conjunction with hazard planning (N=209).

A miscellaneous category of other organizations was also included to determine hazard planning interactions. The most commonly identified organizations included the American Red Cross, the National Resources Conservation Service, the Salvation Army, and faith-based aide organizations.

The final question in the hazard planning section focused on current challenges and limitations in hazard planning (Fig. 8).

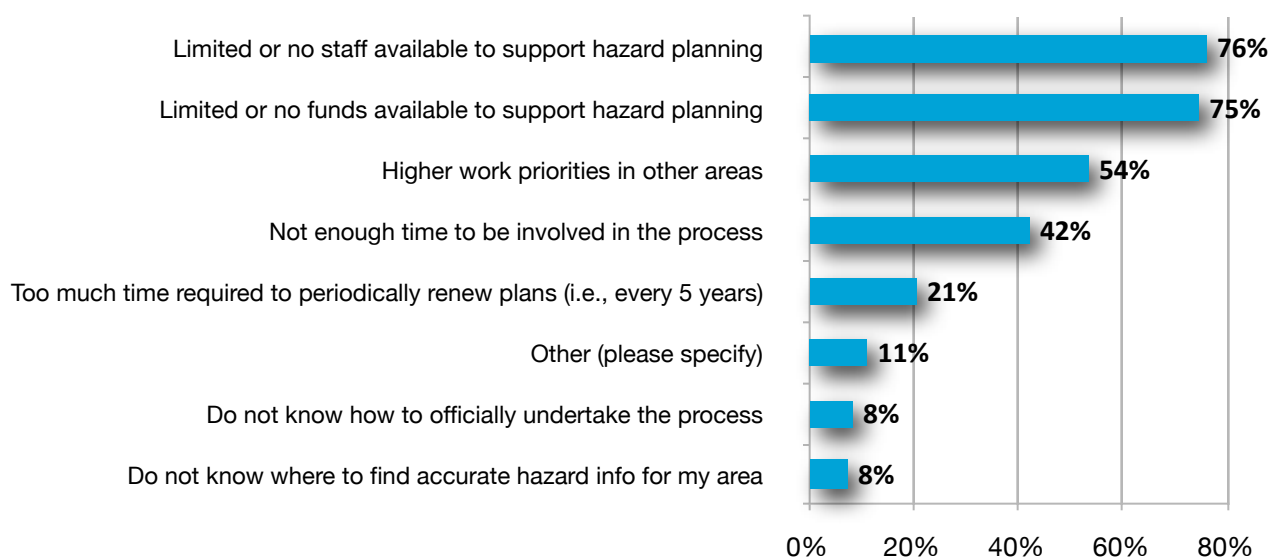


Figure 8. Percent of respondents to select each answer choice (N=213).

Lack of staffing and funds topped the list with approximately 75% of the survey participants selecting each of these answers. Higher work priorities in other areas and lack of time were also fairly commonly selected answers at 53.5% and 42.3%, respectively. In addition, a wealth of

valuable information was provided by many participants through the user-entered “other” answer choice. The following is a selection of the nearly 30 optional answers provided:

- *“General lack of interest from key players...”*
- *“Obtaining local information and meeting federal guidelines.”*
- *“No local government support.”*
- *“Too many active responses to allocate revision time.”*
- *“Not enough climate specific information available to help inform planning choices.”*
- *“State and FEMA plan review process is cumbersome.”*
- *“Lack of easy-to-use tools for plan preparation.”*

A review of the user-provided answers identified several common themes including problems with the FEMA review process, difficulty in easily obtaining information for reports, and a lack of support from government officials. The issue of lack of local governmental support was mentioned repeatedly and appears to be a fairly common, yet substantial hindrance to the hazard planning process.

CLIMATE CHANGE AND PLANNING RESULTS

The climate change section produced a wealth of valuable information in several key areas including perceptions, potential impacts, needs, and planning challenges.

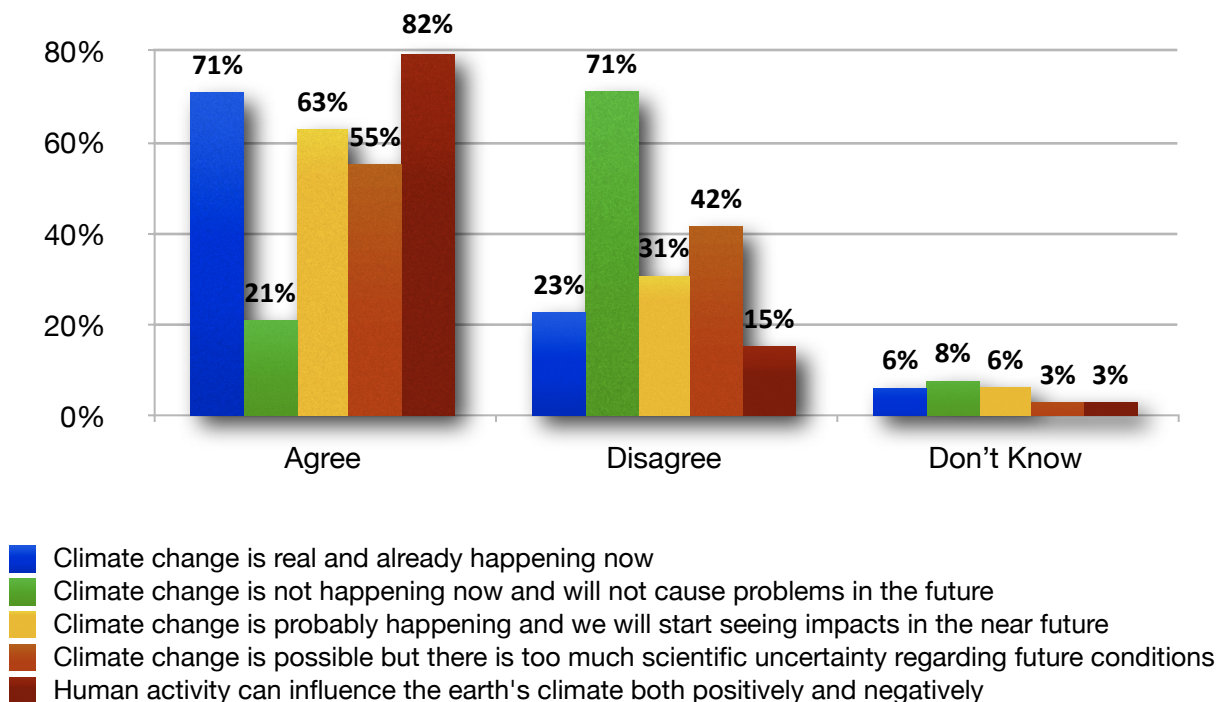


Figure 9. Level of agreement (strongly or slightly) or disagreement on 5 statements (n=225).

To begin the section, participants were asked to agree or disagree (strongly or slightly) with a series of statements on climate change (Fig. 9). Results revealed that 71% of participants agree (strongly or slightly) that climate change is occurring already. This result is considerably more in favor of climate change than other recent national surveys such as the October 2009 study by the Pew Research Center that found a 14% decline (both nationally, and in 8 southern states comprised of all 6 SCIPP states) in the number of Americans who see solid evidence that the earth is warming (compared to an April 2008 study). The non-random nature of the SCIPP survey is one potential contributing factor to the difference in study results.

While respondents largely agree that climate change is occurring, a significant fraction (55%) indicated that climate change is possible but felt that there is too much scientific uncertainty regarding future conditions. Answers also revealed that survey participants largely agreed (82%) that humans can influence the earth's climate both positively and negatively. In a follow-up question, results showed that 63.1% (out of 225) of respondents are concerned to some degree about climate change. The climate knowledge base of participants was also found to be quite significant with 85.7% indicating that they were either well or moderately informed about climate change. The definition of well informed is subjective, however, so this result is qualitative.

Another question asked “which of the following statements best represents your opinion towards preparing for future climate change and related impacts” to help reveal the level of action that planners in the south feel is appropriate at this point (Figure 10). A significant percentage of respondents (59%) felt that preparations should focus on the most likely scenario based on the best available information. 11% indicated that changes to management practices is premature at this juncture, largely due to a lack of information. A total of 21% indicated that they either don't agree with climate change (and thus won't take action), don't plan to take action given lack of governmental direction, or can't currently take planning actions due to a lack of time.

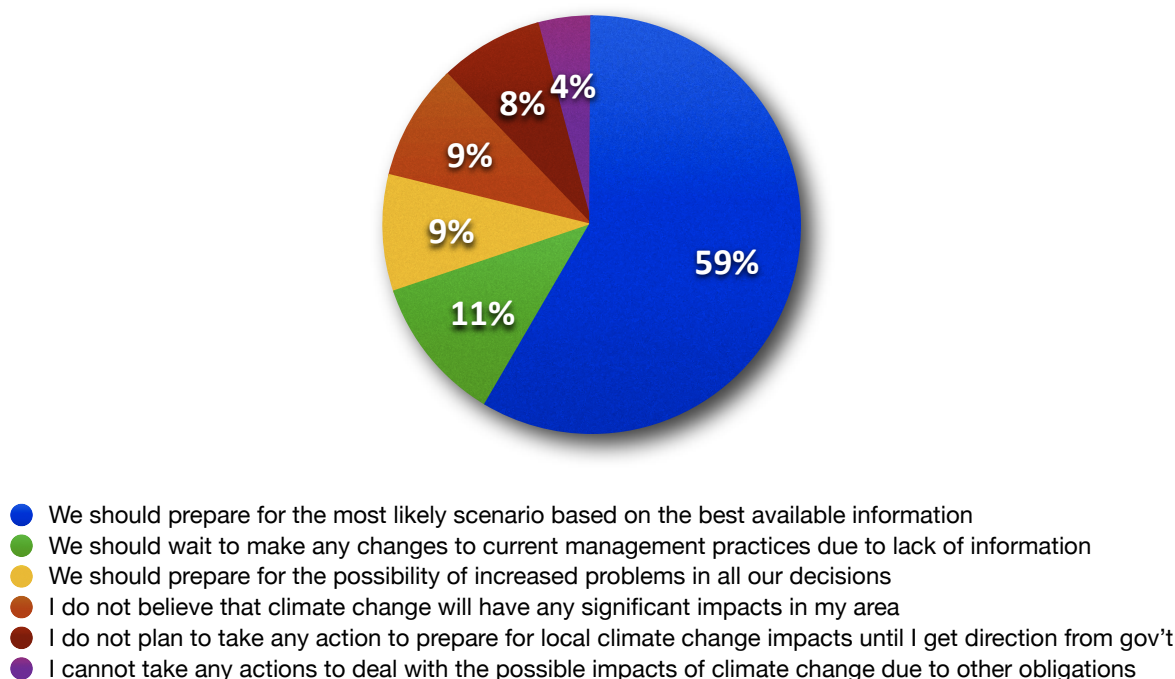


Figure 10. Single answer question focusing on climate change planning actions (n=212).

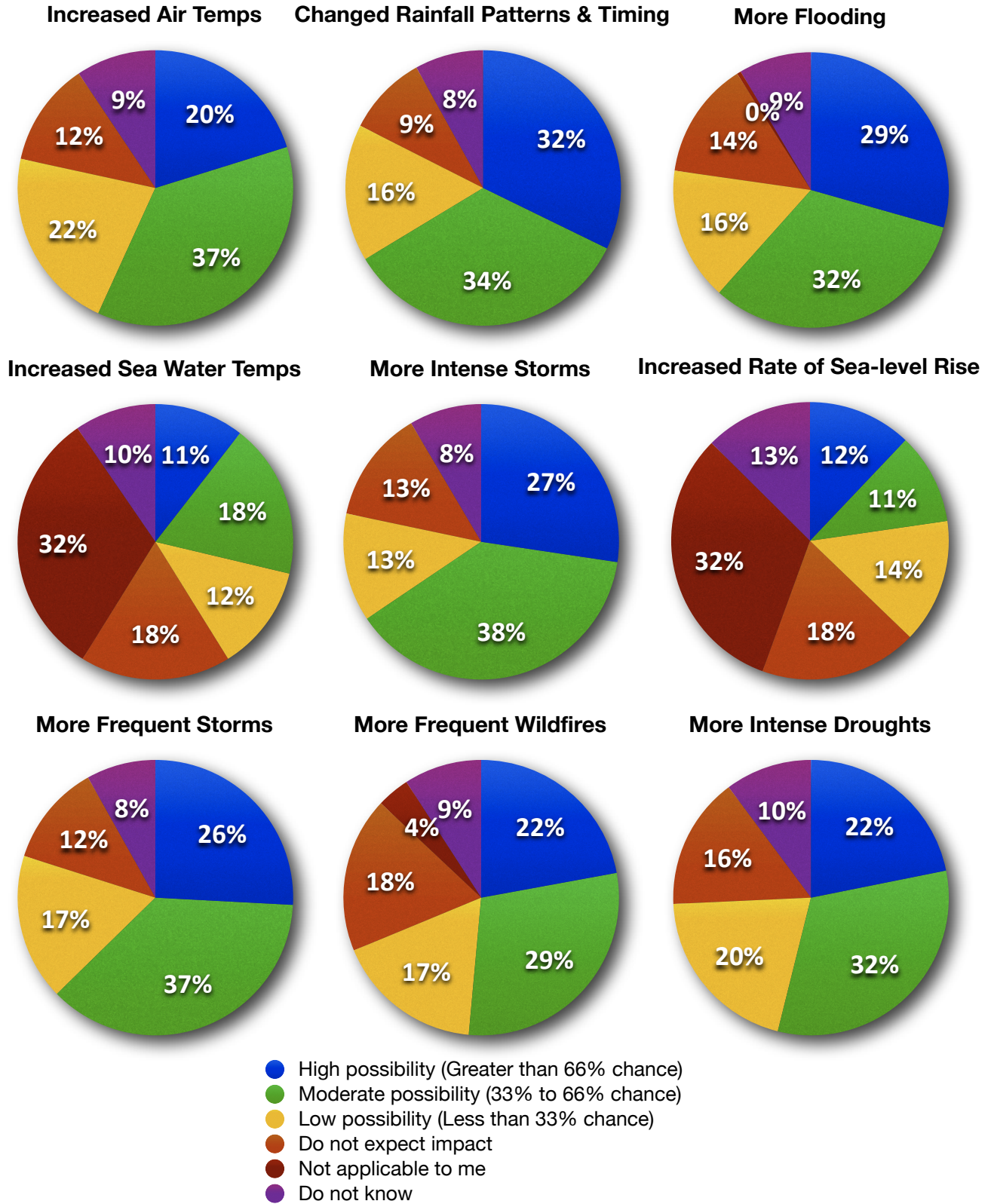


Figure 11. Respondent's 'best estimate' of different climate change impacts for their given area (n=214). Percentages denote breakdown of answer selections for each aspect of climate change. Answers shown here represent only half of items included in the survey.

Survey respondents were also asked to provide their best estimate of potential climate change impacts for their given area, as exemplified in Figure 11 on the previous page, which shows a selection of choices provided in the survey (the full question included 18 different possible impacts; see question 31 in Appendix). Answers are shown as the percentage of each answer choice selected. First, focusing on air temperatures, 57% of survey respondents indicated a high or moderate possibility (as defined in the survey) of increased temperatures, with the remaining 43% representing either a low possibility, no impact, or unknown. A significant percentage of survey takers (66%) indicated a high or moderate possibility of climate change resulting in changed rainfall patterns and timing; this included the largest high possibility percentage selected for of any of the impacts at 32%. Overall, participants indicated relatively high probabilities of more intense storms (65% with high or moderate possibility) and more frequent storms (63% high or moderate possibility). Finally, answers for drought and wildfire-related impacts were less certain than the answers for storms - roughly 50% gave a high or moderate probability of more frequent wildfires or more intense droughts. Answers to sea-related impacts were applicable to a smaller subset of respondents and unfortunately had a relatively small sample size. Focusing only on answers provided by respondents in Louisiana and Mississippi revealed that 44.2% (out of 43 respondents) indicated a moderate or high possibility of increased rate of sea-level rise as an impact of climate change. 18.6% felt there would be no impact while 16.3% were unsure (the remainder of answers went to "low possibility" or "do not know").

In a separate question, 26.3% of survey respondents (56 of 213) indicated that they have included or considered including climate change in their local, county/parish, or state hazard plans. As a follow-up question, survey participants were given an opportunity to explain why or why not, which resulted in a wealth of insightful answers (more than 100 individual responses were collected). The following is a sampling of answers provided:

- *"Don't have the time or money or resources."*
- *"No evidence to suggest it is anything other than normal earth climate cycles which we cannot, at this time, influence."*
- *"I have no guidance in order to put together anything effective. Our plans are designed for the worse case scenario and founded on ESFs."*
- *"Climate change is still not well received as it should be in this area."*
- *"No historical data to use for planning."*
- *"This is a new subject and I would like more information on climate change before I start pushing it into the Hazard Mitigation Plan."*
- *"Lack of specific information for this locality."*
- *"Too much uncertainty."*
- *"Time and manpower on 'more' planning is not available. We can't keep up with the mandatory ones."*
- *"When preparing, all elements of a hazard should be considered."*
- *"I have not thought about doing so until now."*
- *"When I have hard facts to act on, I will take it under advisement."*
- *"Not a hazard required by FEMA."*
- *"Our community is beginning the planning process for explicitly including climate change in hazard mitigation planning."*
- *"Our plan was adopted in 2006, at a time when 'climate change' had not been fully recognized."*
- *"When we re-wrote our plan 4 years ago, it wasn't the issue that it is now."*

- *“Climate change data is inconclusive. Even if it is a real possibility, it would likely be decades before we saw consistent, real effects.”*
- *“Not enough confirmed data for me to know exactly what to prepare.”*
- *“Current mitigation planning calls for hazard analysis of known hazards. Global warming is not scientifically proven to the majority of the emergency managers. In other words, global warming as well as creation is a THEORY. I’m not wasting my time planning on theories.”*

The spectrum of answers illustrates the differing viewpoints and capacities of local level decision-makers and planners to include climate change in the process of hazard planning. Taken together, the answers provide a critical assortment of local-level perspectives and help to highlight areas that need improvement if climate change is to be brought into the hazard planning suite.

Survey participants also identified challenges that hinder the process of planning for climate change at the local level. Figure 12 denotes the challenges that were identified as “big hurdles” and are shown in decreasing order. Top hurdles included funding limitations, staff deficiencies, lack of public awareness, lack of interest by officials, and lack of time to undertake planning.

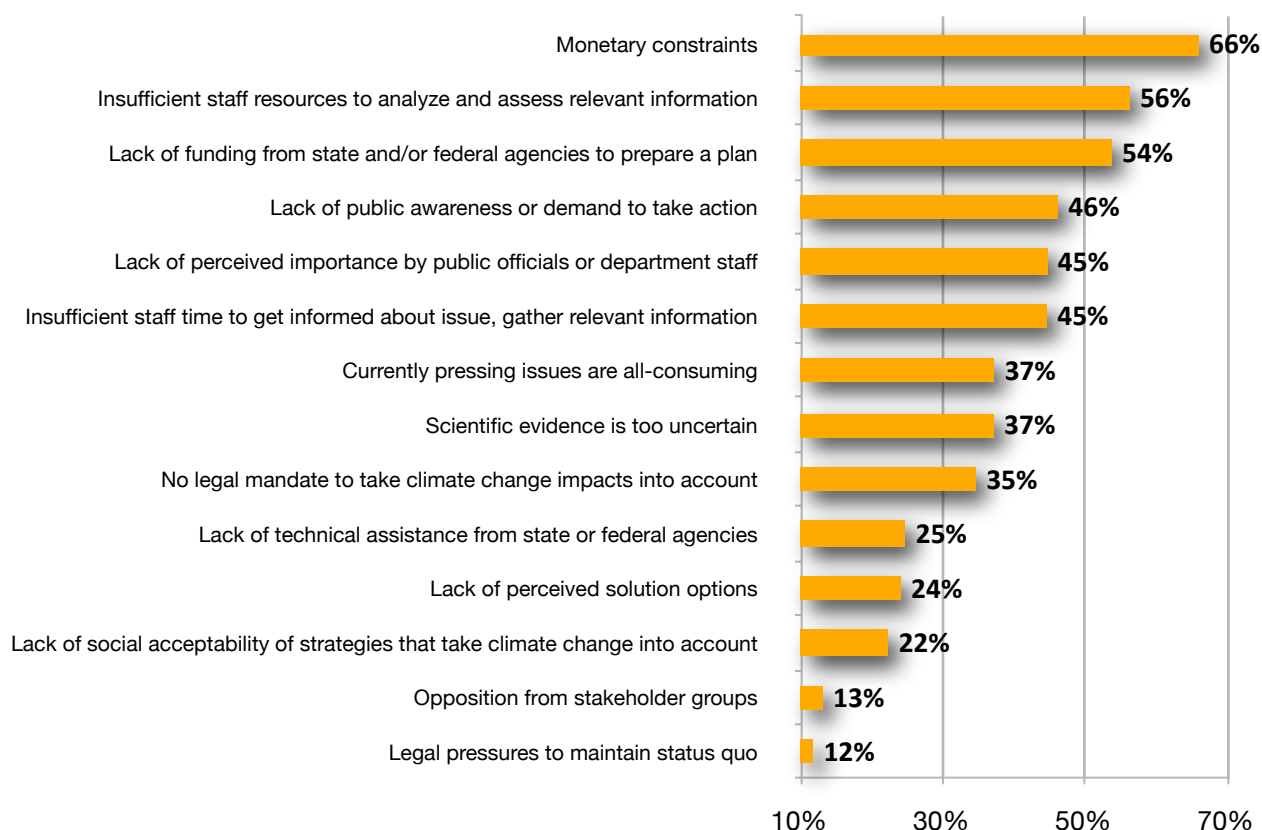


Figure 12. Planning related challenges designated as “big hurdles” by survey respondents (n=201). Other answer choices for this question included “small hurdle”, “not a hurdle”, or “don’t know.”

To finish up the climate change planning section, regional decision-makers were asked to identify key areas of need for including climate change in local hazard plans. Fig. 13 summarizes the approximately 200 answers given. Top answer choices included receiving more climate information applicable to local areas, information on future anticipated climate hazards,

instruction on where to find trustworthy climate information, education on the basics of climate and climate science, and training on climate information product interpretation.

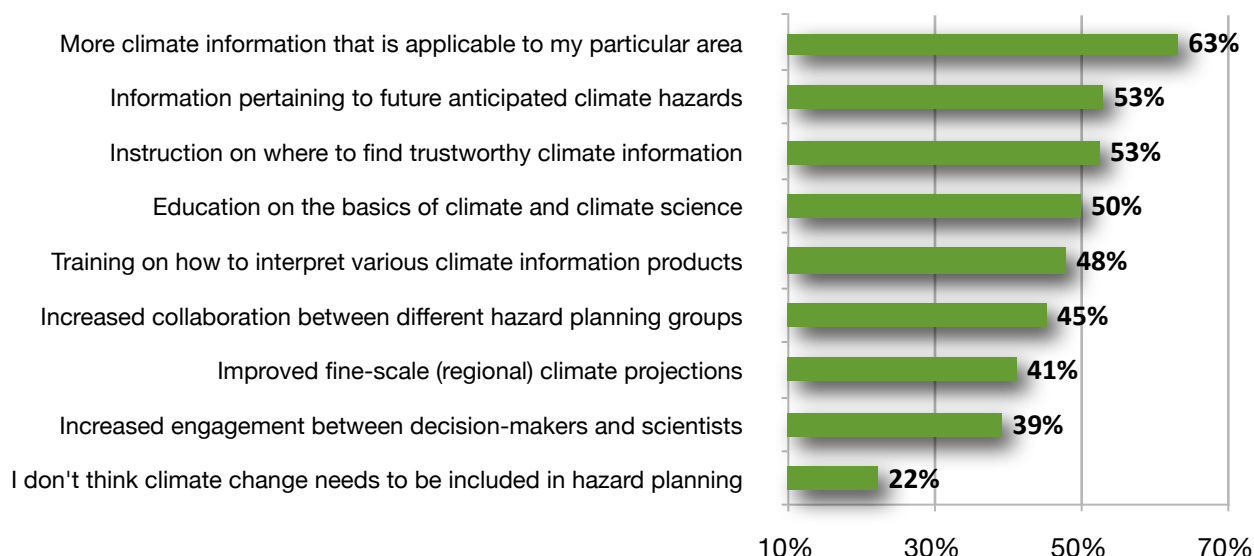


Figure 13. Critical needs for including climate change in local hazard plans (n=196). Respondents could select as many options as applicable to them.

INFORMATION USE AND NEEDS RESULTS

In the final section of the regional survey, participants were asked several questions focusing on information used currently in hazard planning and needs for information. To begin the section a total of 18 different information sources were listed to determine the most critical types of information for hazard planning. The items were presented in a categorized manner and included separate questions with socioeconomic, environmental resource, weather, climate, water, and geological data. Figure 14 identifies the 7 most used sources of information, all of which were used by 50% or more of survey participants. Data sources less commonly used, and not shown here included habitat maps, endangered species maps, water supply and budget forecasts, sea-level rise projections, climate model temperature and precipitation projections, water quality, and several others.

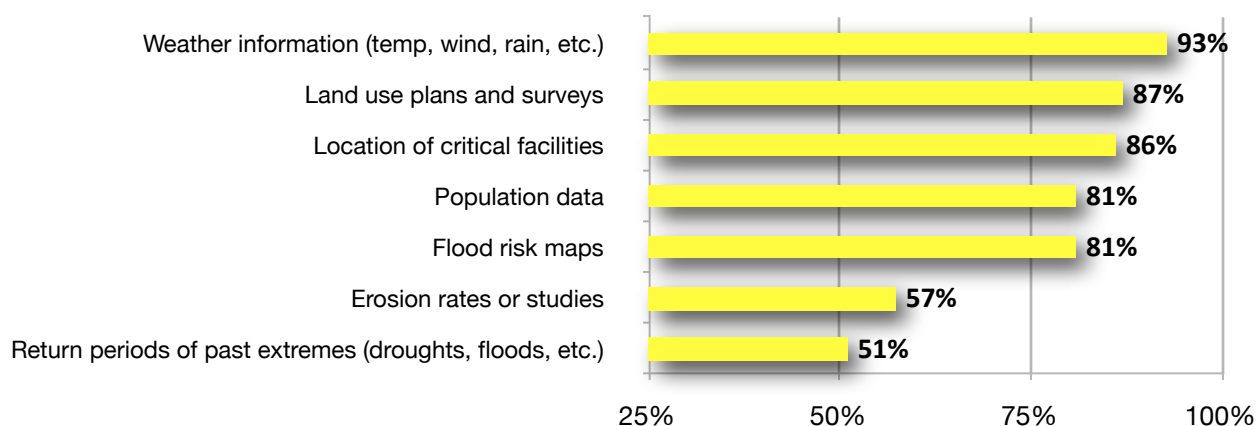


Figure 14. Data and information sources for hazard planning used by at least 50% of survey participants.

It is notable that a majority of the sources used more commonly for hazard planning were more historical in nature - items such as population, flood risk, return periods of past extremes, weather information, land use, etc. Several of the longer-term projection-related data sources were used considerably less thus illustrating either a lack of user familiarity, confidence, knowledge, or a combination of all of these factors.

Survey respondents were also asked to rate the utility of different types of information for determining climate risks, regardless of whether or not they currently plan for future climate. Answers revealed (Fig. 15) that users were more inclined to use shorter-term information sources such as weather and seasonal climate forecasts. Aside from short-term data, information on potential changes in climate impacts were found to be the next most useful information type, thus representing a potential opportunity for SCIPP within this user community. Longer term predictions such as climate projections were found to be less useful, especially for time periods far from now (such as 2040 and beyond).

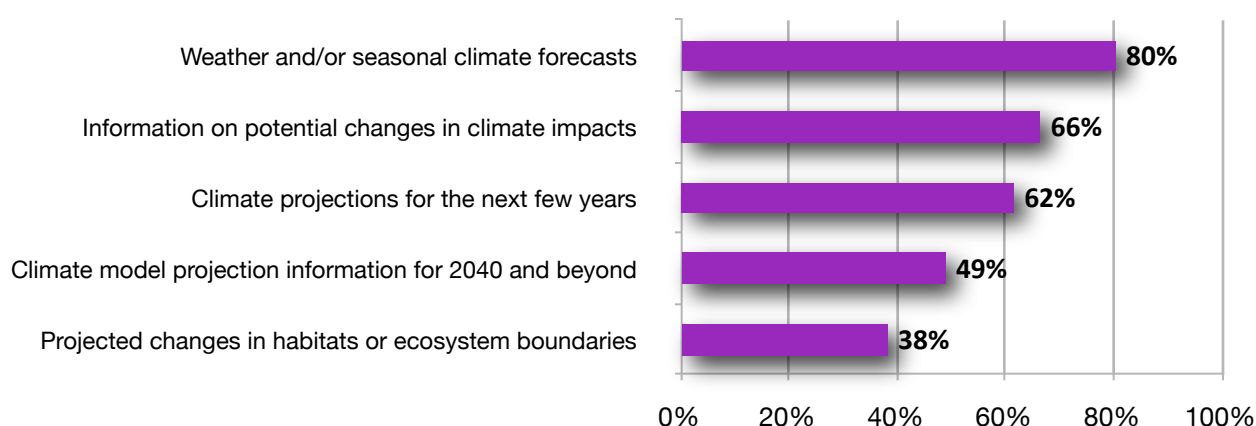


Figure 15. Information for determining climate hazard risks that were rated as extremely or very useful to survey participants (n=194). Other answer choices included “somewhat useful”, “not useful at all”, and “do not know.”

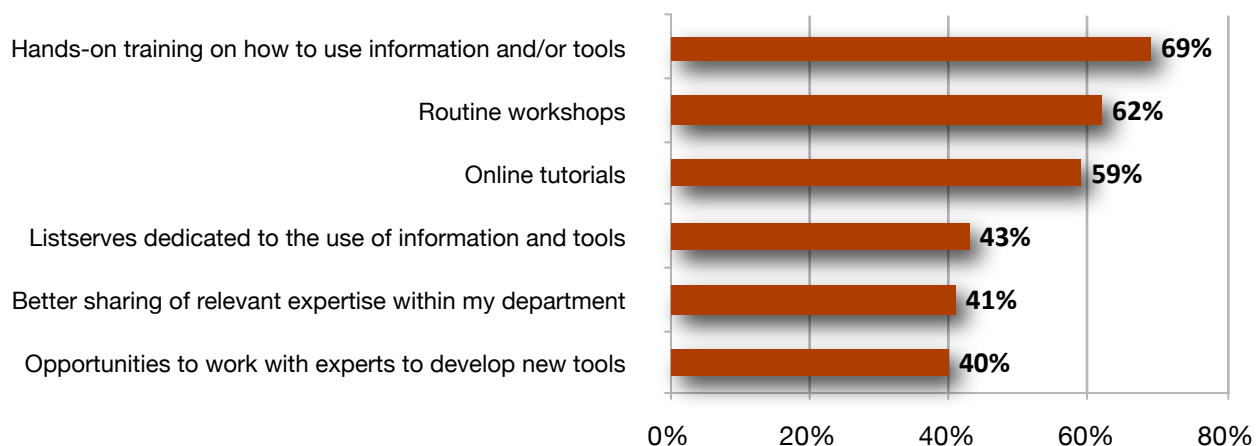


Figure 16. Opportunities for more effective use of information that were rated as extremely or very useful to survey participants (n=193). Other answer choices included “somewhat useful”, “not useful at all”, and “do not know.”

Survey participants were also asked how useful different opportunities would be for enhancing their use of available information and processing tools. The results of this question are depicted in Figure 16, which shows opportunities that were selected as either “extremely useful” or “very useful” by respondents. Hands on training was identified as the most useful opportunity at 69%, followed by workshops at 62%. The distinction between hands on training and workshops is fairly minor, so in general, it appears close engagement is a preferable method for many in the region. Online tutorials were also rated relatively high at 59%, thus providing a potential outreach and education option for the SCIPP program. To verify needs, a final question was posed in which respondents were asked to identify their top 1 and 2 need priorities at present (Fig. 17). Results reaffirmed that hands on training, routine workshops, and online tutorials were the most critical items to continue enhancing planning capabilities, and thus serve as very helpful guidance for the Southern Climate Impacts Planning Program.

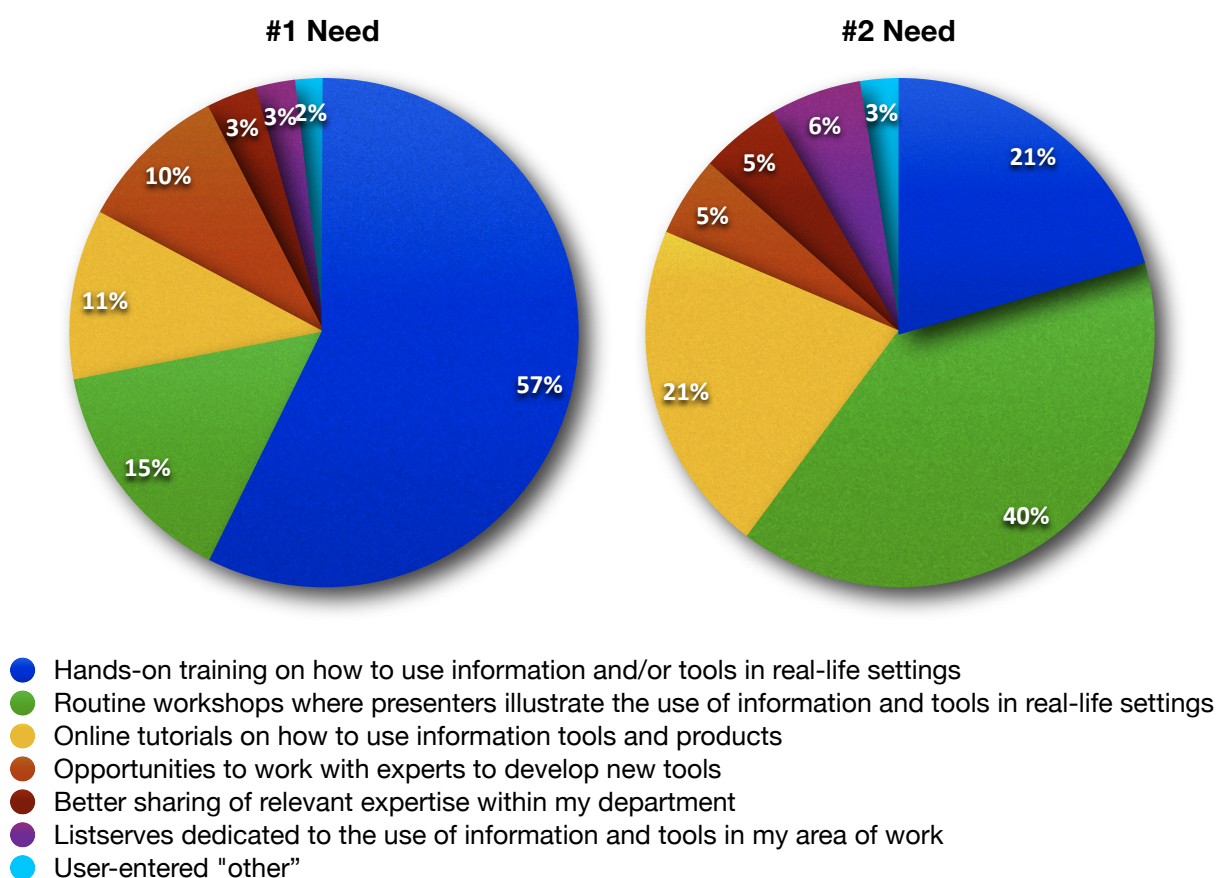


Figure 17. Number one need (left) and number two need (right) of all the opportunities presented in Fig. 15 (n=157).

4. FINAL THOUGHTS

The process of undertaking a fairly comprehensive regional survey, was an incredibly worthwhile and important process, particularly during the early stages of the Southern Climate Impacts Planning Program RISA. As SCIPP's first major regional surveying effort, this project helped to achieve several important tasks including:

- The identification of a key set of critical stakeholder contacts throughout the South,
- The initial introduction of SCIPP to a broad network of planners region-wide which in turn revealed numerous stakeholders ready and interested in working together, and
- The initial assessment of hazard and climate change perceptions, institutional & agency communication lines, information needs, and planning challenges.

The information obtained from the regional survey serves as a record of conditions that existed at the beginning of the SCIPP program. In future years portions of the survey will be re-distributed throughout the region for the purposes of re-evaluating various key areas to assess changes that have taken place.

Future and current stakeholder-driven research programs are highly encouraged to undertake similar efforts to establish baselines relatively early in their course of work; for mature programs this may be more useful as a periodic evaluation exercise. Through the process, much can be gained including the identification of important stakeholders, the emergence of users who want to work together, and the collection of important research results that can help to guide future work, research, and engagement.

ACKNOWLEDGEMENTS

We would like to thank all the survey respondents who took time out of their busy schedules to contribute to this study. In addition, we would also like to thank the group of pre-testers on the University of Oklahoma Risk and Crisis Center Community Advisory Board who provided valuable feedback during the development of the survey.

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6. APPENDIX - SURVEY QUESTIONS

Southern U.S. Hazards and Climate Change Planning Survey

3. SECTION 1: YOUR WORK AND OTHER PERSONAL INFORMATION

1. Your gender

☐ Female

☐ Male

2. What year were you born?

3. Please Select the highest level of education you have completed.

4. Which of the following best describes you?

☐ Caucasian / White	☐ Native Hawaiian / Pacific Islander
☐ African American / Black	☐ Asian
☐ Hispanic	☐ American Indian / Alaskan Native
☐ Other (please specify)	

5. Please indicate what position you hold in your community, county/parish, or state government.

☐ Planner	☐ Harbor, Parks, or Beach Manager
☐ Permitting Officer	☐ Emergency Services Manager
☐ Public Works Engineer	☐ Police or Fire Department
☐ Environmental Specialist	☐ Insurance
☐ Elected Official (e.g. Planning Commissioner, City Council Member)	☐ Education
☐ Community Development Coordinator	
☐ Other (please specify)	

6. Have you been formally involved with hazard planning for your community, county/parish, or state?

☐ Yes

☐ No

Southern U.S. Hazards and Climate Change Planning Survey

7. Please indicate the level at which you are involved with hazard planning:

☐ City / Community level

☐ County level

☐ Multi-county level

☐ State level

☐ Other (please specify)

8. In an average week, approximately what percentage of your work deals with hazard planning issues?

☐ None

☐ Under 20% [up to 1 day/wk]

☐ 20-50% [approx. 1-2.5 days/wk]

☐ 50-75% [approx. 2.5-4 days/wk]

☐ Over 75% [more than 4 days/wk]

☐ Don't know

9. How many staff members in your department (including yourself) share hazard planning management responsibilities for your area?

Southern U.S. Hazards and Climate Change Planning Survey**5. SECTION 2: LOCAL LEVEL HAZARD PLANNING**

10. Which characteristics best describe your area of responsibility? (Please check all that apply)

- ☐ Rural
- ☐ Urban, Mixed-economy
- ☐ Suburban, Residential
- ☐ Metropolitan area
- ☐ Working harbor (fishing, shipping, oil and gas production)
- ☐ Recreational harbor
- ☐ Tourism, Beach, Recreation destination
- ☐ Woodland, Forested
- ☐ Statewide
- ☐ Other (please specify)

11. What is your community's approximate population?

- ☐ < 10,000
- ☐ 10,000 - 49,999
- ☐ 50,000 - 99,999
- ☐ 100,000 - 499,999
- ☐ 500,000 - 999,999
- ☐ > 1,000,000

12. Please identify the state your community or county/parish is located in.

- ☐ Arkansas
- ☐ Louisiana
- ☐ Mississippi
- ☐ Other (please specify)
- ☐ Oklahoma
- ☐ Tennessee
- ☐ Texas

13. Please enter your zip code.

Southern U.S. Hazards and Climate Change Planning Survey

6. SECTION 2: LOCAL LEVEL HAZARD PLANNING

14. Please rate how important hazard planning is for the below listed climate hazards as they currently affect your community, county/parish, or state. The higher the number, the more important it is.

	Critically important (4)	Very important (3)	Important (2)	Not very important (1)	Not important at all (0)
Drought	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐
Dust Storm	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐
Storm Surge	☐	☐	☐	☐	☐
Flood (from rain or rivers)	☐	☐	☐	☐	☐
Inundation (from sea-level rise/land subsidence)	☐	☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐
Hail	☐	☐	☐	☐	☐
Tornadoes	☐	☐	☐	☐	☐
Lightning	☐	☐	☐	☐	☐
Heat Waves	☐	☐	☐	☐	☐
Extreme Cold	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐

Southern U.S. Hazards and Climate Change Planning Survey

15. Please identify the hazards for which your community has developed a hazard mitigation plan (before the hazard; to reduce vulnerability) and/or a hazard response plan (after the event; for recovery). If the hazards are not part of a mitigation or response plan, please indicate if they are a part of another plan or no plan at all.

	Mitigation plan	Response plan	Other plan	No plan	Do not know
Drought	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐
Dust Storm	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐
Storm Surge	☐	☐	☐	☐	☐
Flood (from rain or rivers)	☐	☐	☐	☐	☐
Inundation (from sea-level rise/land subsidence)	☐	☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐
Hail	☐	☐	☐	☐	☐
Tornadoes	☐	☐	☐	☐	☐
Lightning	☐	☐	☐	☐	☐
Heat Waves	☐	☐	☐	☐	☐
Extreme Cold	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐

16. If you answered "other plan" for any of the hazards in Question 15 please specify the plan those appear in. Otherwise you may go to the next question.

Drought	
Wildfire	
Dust Storm	
Hurricane	
Storm Surge	
Flood (from rain or rivers)	
Inundation (from sea-level rise/land subsidence)	
Windstorm	
Hail	
Tornadoes	
Lightning	
Heat Waves	
Extreme Cold	
Severe Winter Storm	

Southern U.S. Hazards and Climate Change Planning Survey**7. SECTION 2: LOCAL LEVEL HAZARD PLANNING**

17. What informational tools do you have in place currently to address your local, county/parish, or state hazards? Please check all that apply.

INFORMATIONAL TOOLS

- ☐ Flood risk maps
- ☐ Disclosure requirements (e.g., on flooding or erosion risks)
- ☐ Educational materials / Information dissemination to public, homeowners
- ☐ Warning system(s)
- ☐ Other (please specify)

18. What planning strategies do you have in place currently to address your local, county/parish, or state hazards? Please check all that apply.

PLANNING STRATEGIES

- ☐ Land use planning
- ☐ Zoning requirements
- ☐ Water quality management plans
- ☐ Water supply management plans
- ☐ Sediment management / Beach nourishment plans
- ☐ Species and/or habitat protection plans
- ☐ Emergency evacuation plans
- ☐ Other (please specify)

19. What policies and regulations do you have in place currently to address your local, county/parish, or state hazards? Please check all that apply.

POLICIES / REGULATIONS

- ☐ Shoreline protection policies and regulations
- ☐ Building codes
- ☐ Density restrictions
- ☐ Flood zone restrictions
- ☐ Water-dependent use restrictions
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

20. What other options do you have in place currently to address your local, county/parish, or state hazards? Please check all that apply.

OTHER OPTIONS

- ☐ Participation in National Flood Insurance Program
- ☐ Regional collaboration on hazard planning
- ☐ Other (please specify)

21. What local groups do you interact with in connection with hazard planning? Please check all that apply.

LOCAL:

- ☐ Economic Development Coalition or Agency
- ☐ Association of City / Council Governments
- ☐ Chamber of Commerce
- ☐ County / Parish Commissioners or Township Officials
- ☐ Rural Development
- ☐ Public Works
- ☐ Public Safety Agencies
- ☐ Homeowner Associations
- ☐ Local Land Trust(s)
- ☐ Environmental Advocacy Groups
- ☐ Other Citizen Groups
- ☐ Small Businesses
- ☐ Scientists/Engineers
- ☐ Developers
- ☐ Industry
- ☐ Consultant(s)
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

22. What regional or state groups do you interact with in connection with hazard planning? Please check all that apply.

REGIONAL / STATE:

- ☐ State Climate Office / Regional Climate Center
- ☐ State Department of Emergency Management
- ☐ State Water Board
- ☐ State Farm Service Agency
- ☐ State Department of Agriculture
- ☐ State Conservation Commission
- ☐ State Corporation Commission
- ☐ State Department of Environmental Quality
- ☐ State Department of Health
- ☐ State Department of Wildlife Conservation
- ☐ State Municipal League
- ☐ Other (please specify)

23. What federal groups do you interact with in connection with hazard planning? Please check all that apply.

FEDERAL:

- ☐ U.S. Department of Agriculture
- ☐ U.S. Department of Health and Human Services
- ☐ USDA Emergency Board (County)
- ☐ USDA Emergency Board (State)
- ☐ U.S. Department of Fish and Wildlife Service
- ☐ U.S. Army Corps of Engineers
- ☐ U.S. Bureau of Reclamation
- ☐ U.S. Department of Defense
- ☐ Federal Emergency Management Agency
- ☐ U.S. Geological Survey
- ☐ U.S. Department of Housing and Urban Development
- ☐ National Weather Service
- ☐ National Oceanic and Atmospheric Administration
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

24. What other groups do you interact with in connection with hazard planning? Please check all that apply.

OTHER:

- ☐ American Red Cross
- ☐ Natural Hazards Center
- ☐ Small Business Administration
- ☐ Natural Resources Conservation Service
- ☐ Other (please specify)

25. What challenges and limitations is your particular planning group faced with in developing hazard plans for your community, county/parish, or state? Please check all that apply.

- ☐ Not enough time to be involved in the process
- ☐ Limited or no staff available to support hazard planning
- ☐ Limited or no funds available to support hazard planning
- ☐ Higher work priorities in other areas
- ☐ Do not know how to officially undertake the process
- ☐ Do not know where to find accurate and appropriate hazard information for my area
- ☐ Too much time required to periodically refresh / renew plans (i.e., every 5 years)
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

10. SECTION 3: CLIMATE CHANGE AND HAZARD PLANNING

26. Please indicate your level of agreement with each of the following statements regarding climate change.

	Strongly agree	Slightly agree	Slightly disagree	Strongly disagree	Do not know
Climate change is real and already happening now.	☐	☐	☐	☐	☐
Climate change is not happening now and will not cause problems in the future.	☐	☐	☐	☐	☐
Climate change is probably happening and we will start seeing impacts in the near future.	☐	☐	☐	☐	☐
Climate change is possible, but there is too much scientific uncertainty regarding future conditions.	☐	☐	☐	☐	☐
Human activity can influence the earth's climate (both positively and negatively).	☐	☐	☐	☐	☐

27. What is your personal level of concern about climate change?

☐ Very concerned
 ☐ Concerned
 ☐ Not very concerned
 ☐ Not concerned at all

28. How well informed do you feel you are about climate change?

☐ Well informed
 ☐ Moderately informed
 ☐ Not well informed
 ☐ Not at all informed

29. Have you ever - personally or in your work - considered the potential impacts of climate change on your community, state, or region?

☐ Personally
 ☐ Both
 ☐ Professionally
 ☐ Neither

Southern U.S. Hazards and Climate Change Planning Survey**11. SECTION 3: CLIMATE CHANGE AND HAZARD PLANNING****30. Which of the following statements best represents your opinion towards preparing for future climate change and related impacts?**

- ☐ We should prepare for the possibility of increased problems in all our decisions, no matter what might happen, and then we won't have to worry about it anymore.
- ☐ We should prepare for the most likely scenario based on the best available information (e.g., scientific studies, economic forecasts), especially in planning decisions that have long-term impacts of 30 and more years.
- ☐ We should wait to make any changes to current management practices because we don't have enough information to know what to prepare for.
- ☐ I don't plan to take any action to prepare for the local impacts from climate change until I get clear direction and leadership from state and/or federal government.
- ☐ I can't take any actions to deal with the possible impacts from climate change because I just have too many other, more immediate challenges on my plate.
- ☐ I do not believe that climate change will have any significant impacts in my area.

Southern U.S. Hazards and Climate Change Planning Survey

31. How might climate change impact your area? Even if you have not previously considered the potential impacts of climate change on your community, county/parish, or state, please offer your best estimate.

	High possibility (Greater than 66% possibility (33% to chance)	Moderate 66% chance)	Low possibility (Less than 33% chance)	Do not expect impact	Not applicable to me	Do not know
Increased air temperatures	☐	☐	☐	☐	☐	☐
Increased seawater temperatures	☐	☐	☐	☐	☐	☐
Increased stream temperatures	☐	☐	☐	☐	☐	☐
Changed rainfall patterns/timing	☐	☐	☐	☐	☐	☐
Changed runoff patterns/timing	☐	☐	☐	☐	☐	☐
More flooding	☐	☐	☐	☐	☐	☐
Less flooding	☐	☐	☐	☐	☐	☐
Increased rate of sea-level rise	☐	☐	☐	☐	☐	☐
More frequent storms	☐	☐	☐	☐	☐	☐
Less frequent storms	☐	☐	☐	☐	☐	☐
More intense storms	☐	☐	☐	☐	☐	☐
Less intense storms	☐	☐	☐	☐	☐	☐
More intense droughts	☐	☐	☐	☐	☐	☐
Less intense droughts	☐	☐	☐	☐	☐	☐
More frequent wildfires	☐	☐	☐	☐	☐	☐
Less frequent wildfires	☐	☐	☐	☐	☐	☐
More frequent severe winter storms	☐	☐	☐	☐	☐	☐
Less frequent severe winter storms	☐	☐	☐	☐	☐	☐

32. Have you ever included or considered including climate change in your community, county/parish, or state hazard plans?

☐ Yes ☐ No

Why or why not? Please explain.

Southern U.S. Hazards and Climate Change Planning Survey**12. SECTION 3: CLIMATE CHANGE AND HAZARD PLANNING**

33. Because of new information/data that is available in conjunction with climate change, what, if any, changes can (or did) you make to your current informational tools in your hazard plan? Please check all that apply.

INFORMATIONAL TOOLS:

- ☐ Update flood risk maps
- ☐ Change disclosure requirements (e.g., on flooding or erosion risks)
- ☐ Provide additional information/educational materials to public, homeowners
- ☐ Install or alter warning system(s)
- ☐ None of the above
- ☐ Other (please specify)

34. Because of new information/data that is available in conjunction with climate change, what, if any, changes can (or did) you make to your current planning strategies in your hazard plan? Please check all that apply.

PLANNING STRATEGIES:

- ☐ Change land use planning requirements
- ☐ Change zoning regulations
- ☐ Update water quality and supply management plans
- ☐ Improve species and/or habitat protection plans
- ☐ Update emergency evacuation plans
- ☐ None of the above
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

35. Because of new information/data that is available in conjunction with climate change, what, if any, changes can (or did) you make to your current policies and regulations in your hazard plan? Please check all that apply.

POLICIES / REGULATIONS:

- ☐ Strengthen shoreline protection policies and regulations
- ☐ Change building codes
- ☐ Change density restrictions
- ☐ Change flood zone restrictions
- ☐ Changed water-dependent use restrictions
- ☐ None of the above
- ☐ Other (please specify)

36. Because of new information/data that is available in conjunction with climate change, what, if any, changes can (or did) you make to other options in your hazard plan? Please check all that apply.

OTHER OPTIONS:

- ☐ Join the National Flood Insurance Program
- ☐ Join other communities in regional collaboration on hazard planning
- ☐ None of the above
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

13. SECTION 3: CLIMATE CHANGE AND HAZARD PLANNING

37. Whether or not your community, county/parish, or state has already taken action to prepare for possible impacts of climate change, how much of a hurdle is or has each of the following issues been in planning ahead?

	Big hurdle	Small hurdle	Not a hurdle	Don't know
Lack of public awareness or demand to take action	☐	☐	☐	☐
Insufficient staff time to get informed about issue, gather relevant information	☐	☐	☐	☐
Lack of perceived importance by public officials or department staff	☐	☐	☐	☐
Insufficient staff resources to analyze and assess relevant information	☐	☐	☐	☐
Scientific evidence is too uncertain	☐	☐	☐	☐
Monetary constraints	☐	☐	☐	☐
No legal mandate to take climate change impacts into account	☐	☐	☐	☐
Currently pressing issues are all-consuming	☐	☐	☐	☐
Lack of funding from state and/or federal agencies to prepare a plan	☐	☐	☐	☐
Opposition from stakeholder groups	☐	☐	☐	☐
Lack of technical assistance from state or federal agencies	☐	☐	☐	☐
Legal pressures to maintain status quo	☐	☐	☐	☐
Lack of social acceptability of strategies that take climate change into account	☐	☐	☐	☐
Lack of perceived solution options	☐	☐	☐	☐

Other (please specify)

38. Please identify the most critical needs for including climate change in your community, county/parish, or state hazard plans. Please check all that apply.

- ☐ More climate information that is applicable to my particular area
- ☐ Instruction on where to find trustworthy climate information
- ☐ Training on how to interpret various climate information products
- ☐ Education on the basics of climate and climate science
- ☐ Improved fine-scale (regional) climate projections
- ☐ Information pertaining to future anticipated climate hazards
- ☐ Increased engagement between decision-makers and scientists
- ☐ Increased collaboration between different hazard planning groups
- ☐ I don't think climate change needs to be included in hazard planning

Southern U.S. Hazards and Climate Change Planning Survey**15. SECTION 4: INFORMATION USE & NEEDS FOR EFFECTIVE HAZARD PLANNING**

39. In order for you to carry out hazard planning, what socioeconomic information do you consult regularly? Please check all that apply.

SOCIOECONOMIC INFORMATION:

- ☐ Population data
- ☐ Property tax information
- ☐ Information on use of recreation areas (types of activities, types of visitors, frequency or intensity of use, etc.)
- ☐ Location of critical facilities
- ☐ Other (please specify)

40. In order for you to carry out hazard planning, what environmental resource information do you consult regularly? Please check all that apply.

ENVIRONMENTAL RESOURCE INFORMATION:

- ☐ Habitat maps or studies
- ☐ Endangered species maps or studies
- ☐ Land use plans and surveys
- ☐ Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

41. In order for you to carry out hazard planning, what weather, climate, and water information do you consult regularly? Please check all that apply.

WEATHER, CLIMATE, AND WATER INFORMATION:

- ☐ Weather information (i.e., temperature, rainfall, winds, etc.)
- ☐ Return periods of past extreme events (droughts, floods, storms, hurricanes, etc.)
- ☐ Flood risk maps
- ☐ Water supply and budget forecasts
- ☐ Water quality information
- ☐ Sea-level rise projections
- ☐ Climate model temperature projections
- ☐ Climate model precipitation projections
- ☐ Other (please specify)

42. In order for you to carry out hazard planning, what geological information do you consult regularly? Please check all that apply.

GEOLOGICAL INFORMATION:

- ☐ Coastal geology maps and reports
- ☐ Sediment budgets
- ☐ Erosion rates or studies
- ☐ Other (please specify)

43. Please list any other pertinent data or information sources you use for hazard planning.

Southern U.S. Hazards and Climate Change Planning Survey

16. SECTION 4: INFORMATION USE & NEEDS FOR EFFECTIVE HAZARD PLANNING

44. Please rate the usefulness of the the following types of information for determining future climate hazard risks.

	Extremely useful	Very useful	Somewhat useful	Not useful at all	Do not know
Weather and/or seasonal climate forecasts	☐	☐	☐	☐	☐
Climate model projection information (temperature, precipitation, etc.) for 2040 and beyond	☐	☐	☐	☐	☐
Information on potential changes in climate impacts such as frequencies of storms, droughts, floods, etc. (which may have a high level of uncertainty)	☐	☐	☐	☐	☐
Projected changes in habitats or ecosystem boundaries	☐	☐	☐	☐	☐
Climate projections for the next few years	☐	☐	☐	☐	☐

Identify any other types of information that may be useful to you:

45. What sources do you typically consult to obtain the data and information you need for your work?

	All the time	Frequently	Occasionally	Rarely	Do not use in my work
Scientific journals	☐	☐	☐	☐	☐
Professional journals	☐	☐	☐	☐	☐
Professional listserves	☐	☐	☐	☐	☐
Research studies (such as reports from the National Academies of Science)	☐	☐	☐	☐	☐
Colleagues in house	☐	☐	☐	☐	☐
Staff at state agency	☐	☐	☐	☐	☐
Colleagues in another community (with similar job responsibilities)	☐	☐	☐	☐	☐
Professional conferences or meetings	☐	☐	☐	☐	☐
Experts at local / state research institution(s)	☐	☐	☐	☐	☐
Non-governmental organizations / non-profits	☐	☐	☐	☐	☐
Internet resources	☐	☐	☐	☐	☐

Other (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

46. How would you rate your ability to use the below listed tools for planning purposes?
Select all that apply.

	I use this tool in my work	Tool used by others in my department	We draw on outside experts for use of this tool	We are building in- house capacity to use this tool	Do not need this tool in my work
Paper maps and overlays	☐	☐	☐	☐	☐
Geographic information systems (GIS)	☐	☐	☐	☐	☐
Analytical tools (i.e., spreadsheet software, MATLAB, S-Plus, etc.)	☐	☐	☐	☐	☐
Web-based information products	☐	☐	☐	☐	☐
Database management tools	☐	☐	☐	☐	☐

Other tools (please specify)

Southern U.S. Hazards and Climate Change Planning Survey

17. SECTION 4: INFORMATION USE & NEEDS FOR EFFECTIVE HAZARD PLANNING

47. In order for you to make the most effective and efficient use of the available information and processing tools, how useful would the following opportunities be?

	Extremely useful	Very useful	Somewhat useful	Not useful at all	Do not know
Opportunities for you to provide input and direction into the development of new products/tools for climate hazard planning	☐	☐	☐	☐	☐
Hands-on training on how to use information and/or tools in real-life settings	☐	☐	☐	☐	☐
Online tutorials on how to use information tools and products	☐	☐	☐	☐	☐
Routine workshops where presenters illustrate the use of information and tools in real-life settings	☐	☐	☐	☐	☐
Listserves dedicated to the use of information and tools in my area of work	☐	☐	☐	☐	☐
Better sharing of relevant expertise within my department	☐	☐	☐	☐	☐

Other (please specify)

48. Of all the options identified in Question 47, please identify your #1 need at present.

49. Of all the options identified in Question 47, please identify your #2 need at present.

50. If there is anything we have not covered regarding hazard planning, climate change, or challenges/needs you may have in association with those, please use the following space to comment as needed. This is completely voluntary.