PLANNING FOR ENHANCED CLIMATE RISKS:
A Perspective from the Military

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1. INTRODUCTION

Preparing for disasters is an essential part of government and business. Preparations for disasters are documented in what are generally referred to as continuity plans.1 In the climate context, continuity plans best fit within the concept of resilience, defined as “the capability to anticipate, prepare for, respond to, and recover from climate impacts.”2 The concept is closely aligned with the concept of adaptation, defined as “efforts to moderate, cope with, and prepare for the current and anticipated impacts....”3 Resilience is best understood as having a greater focus on short term efforts while adaptation focuses on a more distant timeline. Both concepts achieve the same end, to reduce disruptions from climate events.

Disaster trends indicate increased weather severity and patterns that are different than previously experienced.4 Continuity plans exist to identify risks to infrastructure and operations and outline steps to deal with risks. Plan content varies based on an organization’s operations, but all accomplish similar objectives. There is an emerging gap in planning for enhanced climate risks. Drawing especially on a perspective from the military, this paper examines how all organizations can use low-cost options to begin incorporating enhanced climate risks into continuity plans and then synergistically use risk assessment data in other ways, such as adaptation assessments in environmental impact statements for new projects.

Four reasons lead to the conclusion that continuity plans must now incorporate enhanced climate risks. First, globalization and the interconnectedness of economies allow severe weather events to have exponential adverse impact. For example, if a storm disrupts a shipping port, refinery, or other operations, it will impact an entire supply chain

1 Continuity plans are referred to in the Federal government as Continuity of Operation Plans or COOPs. Businesses maintain such plans as part of a Business Continuity Plan.
3 Id.
4 See data cited infra at note 12 reflecting increased frequency and severity of certain severe weather events.
for multiple businesses, not only isolated disruptions. Second, reliance on technology for most aspects of life and business has resulted in the need to harden technical infrastructure to prevent disruptions and to more quickly repair disrupted systems. Households are not able to function without electricity. Businesses must have electricity and connectivity to operate. Third, nature will continue to be a constant risk to human activity requiring comprehensive preparation and response efforts as with other security threats. However, adverse climate impacts present a constant risk that cannot be easily mitigated through traditional security measures. Fourth, the global community has the capacity to identify risks and use its collective will to solve problems. Continuity planning is one small example of how prevention, response, and recovery are easily achieved once the global community commits to action. Nations and communities that have experienced catastrophic events also experience the goodwill of humanity. With commitment, humanity can prevent catastrophe by identifying risks and posturing to mitigate impacts. In this vein, Section II encourages a perspective viewing enhanced climate risks as people view other risks.

Continuity plans exist in most industries but have particular significance and detail to ensure federal operations continue through all manner of disasters. 5 There is an immediate usefulness for plans to incorporate enhanced climate risks based on the trend of increasing severe weather events and changing natural conditions to new norms. To better understand how continuity planning reduces risk of disruptions, Section III surveys federal continuity plan requirements. This discussion includes focused attention on domestic homeland operations and also how deployed military forces are modifying their operational posture due to enhanced climate risks.

Advancing plans to mitigate enhanced climate risks requires improvement in assessing regional and local risks. To this end, Section IV begins with a survey of existing assessment and planning tools. The discussion continues by explaining how assessments

5 See infra, Section 3.
are set to rapidly grow due to government mandated and voluntary industry focus on climate risk planning. Section IV concludes by highlighting how unity of effort in understanding and mitigating enhanced climate risks is a low-cost option for federal entities. Simple steps like adding assessments to existing digital databases will greatly improve assessments and produce savings. These efforts will also assist federal agencies in complying with new environmental assessment requirements. The material discussed makes clear there is opportunity to easily improve planning capacity by data sharing.

The paper concludes that it is prudent and cost-efficient to immediately incorporate enhanced climate risks into continuity plans and then build on that information in new projects and future operations. Concepts discussed in this paper are consistent with the timeless human tradition of individually and collectively planning in order to save lives, reduce suffering, and protect property. Planning for enhanced climate risks will accomplish these objectives and much more.

2. VIEWING MORE SEVERE CLIMATE TRENDS IN THE SPECTRUM OF RISK

Over the past three decades governmental leaders have recognized enhanced dangers from a variety of conditions, including a growing global population, urban density, technological advancements, growing international commerce, and manipulation of the environment. In 1990, the Environmental Protection Agency began speaking of expanding environmental concerns in terms of risk. Ranking high on the list of concerns were “emerging environmental problems [threatening] to change atmospheric chemistry

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to such an extent that global climate patterns were altered.” These are not now new ideas. All human activity comes with risk. With risk comes the responsibility to evaluate and plan for possible events.

Risk assessment seeks to define and estimate the extent of a risk so that people may manage it by reducing the potential for and severity of impacts. This includes acknowledging unknown conditions and deciding whether to prioritize understanding unknowns or living with the risk of not knowing what can be understood about environmental concerns. As with many topics, it is often difficult to interpret data and develop policies with unanimous consent. Such is the case with evaluating risks associated with changes in climate.

Increasingly severe weather events have been traced to both anthropogenic and natural climate variability. Though many debates will continue on causes of and solutions to climate risks, all can agree prevention is the best solution and planning will always be required. Nature is inherently unpredictable. Unpredictable trends and conditions lead to ahistorical weather events. New atmospheric norms could have an adverse impact on humanity and community norms in many local areas. These are risks that world governments, corporate leaders, and presumably citizens and consumers are willing to accept in order to preserve immediate economic consistency enjoyed by some of the world’s population. Practical courses of action targeting emerging climate concerns will result in immediate benefits with increased organizational resilience.

Resilience to climate risk is now an essential part of risk mitigation efforts. There is evidence of severe weather events increasing more frequently over the past three

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8 Id. at 13 (referencing a different version of cited EPA report listing global climate change in high-risk tier of environmental concerns). See also CARNEGIE COMM’N ON SCI., TECH., AND GOV’T, RISK AND THE ENVIRONMENT—IMPROVING REGULATORY DECISION MAKING (1993) (discussing environmental risks including the cited EPA report).

9 Id. at 2 (stating “Risk assessment is the process by which the form, dimension, and characteristics of that risk are estimated, and risk management is the process by which the risk is reduced.”).


11 See infra Section 3.
decades. Greater climate risks should be incorporated into continuity plans based on the evidence that disruptive weather events can be expected to occur with increased intensity.

Recent storms demonstrate there may be a lack of planning to operate through ahistorical severe weather events. For example, in October 2015, South Carolina suffered 1,000 year level flooding from Hurricane Joaquin. The terminology for flooding and other hazards is a risk calculation expressing the probability that an event is likely to happen in any given year, sometimes referred to as a recurrence interval. Such calculations inherently involve scientific complexity. Still, risk calculations like those used to develop floodplain maps, help people determine vulnerabilities. For risk managers, it is prudent to incorporate greater risk factors than currently used. Flood risks demonstrate the current deficiency.

The Federal Emergency Management Agency (FEMA) training handbook on flood risk assessment provides a table of annual flood probability and corresponding recurrence interval from annual risk to 500-year risk. Recent storm events have recorded levels in excess of the 500-year flood risk. Literature reflects that it is common to think of a 500-year flood as the worst-case flood scenario. This is reinforced in the cited FEMA training. If FEMA training and consumer educational material does not include 1,000 year flood recurrence risk, it is reasonable to conclude that decision-makers may not be planning for such events. With warnings from climate scientists that weather events may become more

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17 American Society of Civil Engineers, So You Live Behind A Levee! What you should know to protect your home and loved ones from floods 18 (2010) (noting a maximum 500-year level, which could mislead consumers to believe that is the greatest risk) available at http://content.asce.org/files/pdf/SoYouLiveBehindLevee.pdf.
aggravated by warming conditions it is prudent for risk managers to anticipate greater risks than currently considered.

Events like so called “1,000 year” floods and “superstorms” demonstrate that historically rare weather events happen and are predicted to occur more frequently due to increased intensity of regular weather patterns. It is unsatisfactory for governments and organizations to be unprepared for these events due to lack of planning. An immediate step toward better preparedness is to incorporate enhanced risks into continuity planning. This is consistent with what civilizations have been doing throughout human history.

3. CONTINUITY PLANS MUST INCORPORATE ENHANCED CLIMATE RISKS

Continuity planning has long existed in many forms and is rooted in the human will to survive. Humanity’s earliest civilizations understood risk and planned for unexpected events, especially in war.18 Identifying and planning for risk has become very sophisticated in developed nations.19 An overarching policy of the United States is “to provide a system of emergency preparedness for the protection of life and property…from hazards and to vest responsibility for emergency preparedness jointly in the Federal Government and the States and their political subdivisions.”20 To this end, many federal agencies have responsibilities to ensure the continued and efficient functioning of civil government throughout catastrophic incidents and recovery operations.

Numerous laws specifically mandate planning to maintain continuity of operations in areas such as intelligence threats,21 small business disaster relief loans,22 public health

19 See E.g. discussion infra Section 3 (including continuity requirements on electronic technology).
operations,\textsuperscript{23} hazardous waste operations,\textsuperscript{24} and protecting federal information technology systems.\textsuperscript{25} There are also numerous regulatory provisions applicable within governmental agencies detailing specific requirements for continuity plans.\textsuperscript{26}

### 3.1 Federal Risk Assessments

Federal agencies are required to identify their essential functions and maintain a continuity plan to perform those functions in all forms of incidents.\textsuperscript{27} In May 2007, President George W. Bush issued a National Contingency Policy\textsuperscript{28} followed three months later by the Policy’s implementation plan.\textsuperscript{29} Federal agencies are also required to prepare for impacts of a changing climate.\textsuperscript{30} The immediate need is to posture federal facilities and operations with more resilience.

To increase resilience, FEMA issued Federal Continuity Directive 1 to guide federal agencies in developing and improving continuity plans.\textsuperscript{31} Mandatory requirements continue to expand, such as a recent statutory mandate to incorporate telework policies into plans, which would supersede standing agency telework policy.\textsuperscript{32} This demonstrates that while agency-specific continuity plans are tailored to essential functions, universal mandatory provisions are emerging. Currently, climate resilience is not included in the

\textsuperscript{23} 42 U.S.C. 300hh-1(b)(6) (2015) (requiring the Public Health Service maintain continuity of operations ensuring “vital public health and medical services to allow for optimal Federal, State, local, and tribal operations in the event of a public health emergency.”)
\textsuperscript{24} 42 U.S.C. §6924 (2015) (requiring owners and operators of hazardous waste treatment, storage, and disposal facilities maintain continuity of operation and trained personnel consistent with the degree and duration of associated risks);
\textsuperscript{25} 44 U.S.C. §3554(b)(8) (2015) (this provision is an information security mandate requiring the head of each agency to establish plans and procedures to ensure continuity of operations for respective information technology systems).
\textsuperscript{26} See \textit{E.g. infra} text accompanying note 43 (explaining Dep’t of Defense continuity plan requirements).
\textsuperscript{27} 42 U.S.C. §5196 (tasking the FEMA Director with emergency preparedness and authorizing with Presidential concurrence the delegation of authority for other agencies to prepare plans). See also, \textit{The National Continuity Policy Implementation Plan (August 2007)} and associated material at https://whitehouse.gov1.info/continuity-plan/index.html (providing an overview of the federal continuity posture).
\textsuperscript{29} U.S. HOMELAND SECURITY COUNCIL, NATIONAL CONTINUITY POLICY IMPLEMENTATION PLAN (Aug. 2007).
template federal continuity plan, but could easily be included. Enhanced climate risks have universal relevance and therefore should be included in all agency continuity plans.

There is a FEMA template continuity plan for non-federal governments and a separate template for federal agencies that increases the uniformity of considerations and content across the federal enterprise. The federal agency template plan includes a risk assessment guide that begins with identification of all hazards and a vulnerability assessment to determine the effects of identified hazards on an organization’s essential functions. The template notes the requirement for each organization to conduct a risk assessment at least every five years. The purpose of the evaluation is to evaluate “what levels of relative risk are acceptable” in order to prioritize assets in planning for incidents. Including in the template a recommendation to consider enhanced climate risks would both improve the continuity focus and satisfy the mandated adaptation analysis required in Executive Order 13653. Even with the best template plan in place, agency leaders must understand and appreciate enhanced climate risks as they do other threats.

Currently, efforts to plan for human threats and natural threats diverge. For example, the Federal Interagency Security Committee Standard focuses primarily on “manmade” incidents, noting: “Other hazards to buildings such as earthquakes, fire, or storms are beyond the scope of this document and are addressed in applicable construction standards, although many of the countermeasures identified will contribute...

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35 Id. at p.5.
36 Id. at p.1-1.
37 Id.
38 See supra note 30 (requiring federal agencies to prepare for climate change impacts).
to mitigating natural hazards.”

The reality is that construction standards are not universal and may not include specifications to mitigate enhanced climate risks. Even if they did, the risks extend to operations, not just infrastructure.

Severe weather events can cause disruptions as severe as those of a terrorist attack. There are distinct differences between an intentional attack on a facility, such as severing communication lines, and a natural disaster that severs the lines. We can predict and warn of specific climate risks. Terror threats strike with no notice. The comparison is made to highlight the distinct value in planning for enhanced climate risks. Resilient operations with solid continuity plans are able to efficiently deal with climate risks. While the size of an event can cause surprise, like a storm’s strength at landfall, there is little surprise that such an event will occur. While risk mitigation efforts will focus on preventing specific incidents, risk planners and organizational leaders can best increase resilience by approaching the risk identification process with a perspective that recognizes the severity of enhanced climate risks. The task of updating continuity plans to sufficiently plan for enhanced climate risks is more important for some government agencies than others.

3.2 U.S. Armed Forces Homeland Defense and Domestic Operations

The U.S. Armed Forces maintain more extensive continuity and operational plans than those required by many other federal agencies. A foundational document for the U.S. Armed Forces succinctly captures the essence of military continuity planning as ensuring performance of mission essential functions “under all circumstances, including crisis,

40 See infra text accompanying note 89 (discussing a leading civil engineering climate risk adaptation report in 2015, two years after the issuance of the Interagency Security Committee Standards).
41 CTR. FOR LAW & MILITARY OPERATIONS, THE JUDGE ADVOCATE GEN.’S LEGAL CTR. & SCH., U.S. ARMY, DOMESTIC OPERATIONAL LAW 2013 HANDBOOK FOR JUDGE ADVOCATES 1 n.4 (2013) (concluding “Federal analysis indicates that the direct toll in lives and financial costs from natural disasters in recent decades far outweighs that from terrorist attacks.”).
attack, recovery, and reconstitution.” 42 To this end, the Department of Defense (DoD) requires all continuity and programing to be “based on risk-management assessments to ensure that appropriate operational readiness decisions consider the probability of an attack or incident and its consequences.” 43 This policy requires that DoD entity continuity plans incorporate all reasonably foreseeable operational disruptions and plan for these types of incidents. The military is beginning to view climate risks as a threat to the homeland on par with terrorism. 44 This view stems from federal military forces increasingly being called upon to perform a mission referred to as Defense Support to Civil Authorities (DSCA). 45

Severe weather events are the most likely events that will result in civil emergencies and DCSA military operations. Domestic operations present what senior military officers accurately refer to as unique challenges due to restrictions on federal military operations within the United States. 46 The military will need to increasingly plan for domestic operations as it is called upon in response to severe weather events. 47 This view has resulted in federal military forces improving disaster response efforts. For example, during Hurricane Katrina, “no one had the total picture of the forces on the ground, the forces that were on the way, the missions for which forces had been allocated, and the missions that still needed to be done.” 48 A decade of refinement resulted in a more successful response to Superstorm Sandy than what was achieved by the military response to Hurricane Katrina. 49

43 D E P ’ T O F D E F E N S E D I R . 3 0 2 0 . 2 6 , para. 4.b. (J a n . 9 , 2 0 0 9).
44 See supra note 41 (comparing terrorism threats to Hurricane Katrina and Superstorm Sandy).
45 D E P ’ T O F D E F E N S E D I R . 3 0 2 5 . 1 8 (J a n . 2 1 , 2 0 1 2) (e s t a b l i s h i n g p o l i c y a n d a s s i g n i n g r e s p o n s i b i l i t i e s f o r D S C A o p e r a t i o n s).
46 J O I N T C H I E F S O F S T A F F, J O I N T P U B. 3-28, D E F E N S E S U P P O R T O F C I V I L A U T H O R I T I E S , p a g e s v i i , I-1, I I -7 (J u l . 3 1 , 2 0 1 3).
47 See infra text accompanying notes 48-49.
49 See Gen. Charles H. Jacoby, Jr. and Gen. Frank J. Grass, D u a l - S t a t u s, S i n g l e P u r p o s e : A U n i f i e d M i l i t a r y R e s p o n s e t o H u r r i c a n e S a n d y (M a r . 1 1 , 2 0 1 3), h t t p : / / w w w . a n g . a f . m i l / n e w s / s t o r y . a s p ? i d = 1 2 3 3 3 9 9 7 5 a n d D o n n a M i l e s , S a n d y
Given the complexity of climate risks and the widespread impact of climate events, federal forces may be called upon to assist civil authorities with planning for these risks. Restrictions on domestic military operations provide the perspective of historic wisdom that although federal forces are often capable of accomplishing certain domestic activities, they should not always be used to do so.\textsuperscript{50} The question becomes to what extent federal forces should be involved in domestic efforts to plan for enhanced climate risks. Military lawyers generally agree that when state or local governments are on the brink of failing, federal forces may temporarily support law enforcement continuity of operations efforts to “restore essential government services, protect public health and safety, and provide emergency relief,”\textsuperscript{51} and likely only when state National Guard forces are unable or not equipped to respond. With increasingly severe weather events now foreseeable risks, there is a legitimate case to be made that one of the best uses of the military is to help society master planning for enhanced climate risks.

Department of Defense entities incorporate various facility specifications such as defense facility antiterrorism and force protection standards into all operations.\textsuperscript{52} By civilian standards, rather extreme planning and hardening of mission critical facilities incorporate building specifications to withstand events such as high-altitude electromagnetic pulse (EMP) attacks.\textsuperscript{53} This demonstrates that parts of the federal government are experts in identifying all manner of operational risks and planning for continuous operations through extreme and low-probability events. Enhanced climate risks pose a greater threat to defense facilities than a high altitude EMP. Climate risks are not adversaries that can be defeated with a military campaign. These emerging risks

\textsuperscript{50} See supra note 46 and accompanying text.
\textsuperscript{52} UNIFIED FACILITIES CRITERIA, DEP’T OF DEFENSE, MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS, UFC 4-010-01 (Jan. 22, 2007).
\textsuperscript{53} MILITARY STANDARD SHEET 188-125-1 (Apr 7, 2005).
require the same level of analysis and planning that other operational risks receive. The military has no choice but to plan for increasingly severe weather and natural conditions. Sharing the assessment data through processes recommended in Section IV will enable governmental and private entities to address these emerging concerns. These risks extend to global operations, requiring strategic resiliency planning.

3.3 Strategic Global Military Planning

In addition to homeland defense and support to civil authority, the U.S. Armed Forces have formally established programs to observe, predict, and adapt to climate change. There is a growing list of resources focused on understanding climate impacts on military operations. A recent Department of Defense report to Congress provides a succinct perspective of global military challenges due to enhanced climate risks. Climate conditions increase stress in vulnerable regions leading to “refugee flows, and conflicts over basic resources such as food and water.” Strategic military planning for climate risks focuses on four general areas: persistent conditions such as temperature and precipitation, increasing severity of extreme weather events, impacts from sea level rise, and the opening up of the Arctic region. Current planning necessarily focuses on immediately increasing resiliency in operational posture targeted for specific regions.

Military operations are organized under Geographic Combatant Commands. As implied in the reference, these organizations control the activities in certain geographic

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57 Id. (citing National Security Strategy, White House, February 2015).
58 Id. at 4-5.
59 Id. at 7.
60 See E.g. Id. at 7-13 (listing specific commands and discussing unique climate risks in those locations).
areas. Climate risks are being incorporated into current planning cycles with unique risks emerging in different locations. For example, U.S. Central Command operations in the Middle East require planning for increased water scarcity. U.S. European Command is postured to conduct more search and rescue operations in the Arctic region due to increased vessel traffic and tourism. U.S. Pacific Command has built up Pacific Augmentation Teams in the region to shorten disaster response times. This is just a sampling of ongoing efforts that will continue to grow as climate risks increase.

Military efforts are building resilience to climate risks, but these concerns extend far beyond federal operations. It is important to view these challenges with the understanding that they are not unique to a single government or industry. Maintaining a comprehensive perspective of human activity and enhanced climate risks will prevent a disjunctive effort to mitigate and even prevent these risks. To this end, all federal efforts in this area should remain mindful of approaches to mitigate climate risks in sectors like the financial industry, public corporations, and professional sector guidance. Awareness of these

\[ \begin{align*}
61 \text{ Id.} \\
62 \text{ Id. at 9.} \\
63 \text{ Id. at 10.} \\
64 \text{ Id. at 12.} \\
65 \text{ Regulated financial institutions must conduct a business impact analysis (BIA) and risk assessment to plan for wide-scale disruptions, including events that cause a severe disruption or destruction of transportation, telecommunications, power, or other critical infrastructure components where a governed institution conducts business. Such analyses and assessment include the impact and probability of disruptions caused by natural events such as fires, floods, severe weather and related technical failures disrupting communications, electricity, transportation, and water supply. See Bd. of Governors of the Fed. Reserve Sys., The Federal Reserve Purposes & Functions 59 (9th ed., 2005); Bd. of Governors of the Fed. Reserve Sys., SR 03-9 (May 28, 2003) (the “Interagency Paper on Sound Practices to Strengthen the Resilience of the U.S. Financial System” is attached to this SR notice); Bd. of Governors of the Fed. Reserve Sys., SR 15-3 (Feb. 6, 2015); FFIEC, Business Continuity Planning IT Examination Handbook, at A-3 (Feb. 2015).}
66 \text{ Publicly traded companies are facing increasing pressure to disclose how enhanced climate risks are having a financial impact on infrastructure and business operations, requiring incorporation of these risks into continuity planning. See Nina Hart, Legal Tools for Climate Adaptation Advocacy: Securities Law, SABIN CTR. FOR CLIMATE CHANGE LAW, COLUMBIA LAW SCHOOL (May 2015) (explaining how “governments and investors can use financial disclosure as a tool to incentivize or pressure publicly traded companies to undertake climate change adaptation measures.”).}
67 \text{ See E.g. Stephen N. Zack, Surviving A Disaster – A Lawyer’s Guide to Disaster Planning, A.B.A. COMM. ON DISASTER RESPONSE, at Forward (2011) (providing guidance for law office continuity planning to prevent professional ethics violations due to loss of records and client confidentiality during climate events).}
\end{align*} \]
many resilience efforts will enable federal entities to incorporate into their own practices the collective innovation taking place in business operations.

Understanding and adapting to changing climate risks is a monumental effort for any size organization. Federal efforts have the potential to create processes and technology that would otherwise simply be unachievable. Current climate risk planning challenges do not require the creation of futuristic technology but rather organization of existing data and leading a conjunctive approach to identifying and mitigating enhanced climate risks.

4. CLIMATE RISK TOOLS FOR CONTINUITY PLANNING

It is inherently difficult to grasp the local impact of global issues. This is a challenge to creating local climate risk assessments. There are examples of civil engineering firms conducting local comprehensive risk assessments, demonstrating both the feasibility and interest in accomplishing such assessments. Given the recent emergence of concern to plan for enhanced climate risks, accessible planning tools are needed to enable widespread use.

Technological advancements allowed for the creation of the tools discussed in this section. There is great potential for technology to improve data collection but also to synthesize current data to enable users to more easily identify comprehensive and specific risks to infrastructure and operations. This section provides an overview of planning tools readily available for use in strengthening continuity plans.

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68 In support of this assertion consider the development and maintenance of the Global Positioning System, nuclear technology, advanced aircraft design, rapidly established logistic supply chains, and numerous other endeavors that would be more difficult to accomplish outside of an organization like the United State Government.

69 See E.g. David J. Odeh, Natural Hazards Vulnerability Assessment for Statewide Mitigation Planning in Rhode Island, 3(4) NATURAL HAZARDS REV. 177-187 (Nov. 2002) (employing a process to produce comprehensive and detailed vulnerability assessments, including a combined risk scoring system for hazard and exposure).
4.1 Comprehensive Hazard Assessment Tools

Identifying best possible options is a great way to gain momentum in addressing emerging risks. No single assessment tool exists to comprehensively evaluate enhanced climate risks. It is easy to be overwhelmed by the volume of data produced in the global effort to understand climate risks and mitigate climate impacts. The resources discussed below are provided as examples of existing tools that have the ability to focus on regional and local areas of the United States. Although many other resources exist, like the Intergovernmental Panel on Climate Change (IPCC), assessments with a global focus may not be the most useful in developing local resilience and adaptation plans. It is technically feasible for a database to maintain user friendly data that contains historical abnormal conditions such as temperature extremes, flooding, snow, ice, storm surge, wildfires, and many other climate hazards. That tool does not yet exist, but its existence is a worthy goal for the government agencies, nonprofits, and even profit-driven sectors like the insurance industry. This is not to say that useful tools do not exist; they do.

Risk maps currently allow users to zoom in to a particular area and obtain selected data. Here is a sampling of databases that are easily accessible:

- The World Bank’s Global Climate and Disaster Data tool allows users to zoom in on local areas and select climate hazard risks based on historical data. The Climate and Disaster Risk Screening Tool allows users to input detailed project information and build a standard format report identifying risks and mitigation options. This second tool functions best as a guide to produce an adaptation assessment for new projects.

- The National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI) tracks severe weather events and reflects them in historical context, providing users regional climate hazard event details.

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- FEMA’s GeoPlatform provides geospatial data and analytics in support of emergency management.74 Navigating the comprehensive tools and data can be overwhelming. However, accessing tools like FEMA’s National Flood Hazard Layer (Official)75 application provides users a powerful tool to understand proximity to flood risk zones even if an organization’s built infrastructure is not located in a high risk flood area.

- The National Centers for Environmental Information (NCEI) Climate Extremes Index provides insight to current U.S. regional extreme temperature and precipitation trends;76

- U.S. Climate Resilience Toolkit layers historic temperature and precipitation on an interactive map;77

- Columbia University’s Earth Institute, International Research Institute for Climate and Society produces a Seasonal Climate Forecast with temperature and precipitation projections for up to six months;78

- World Resources Institute, Aqueduct Water Risk Atlas is based on records from 1985-2011 maintained by the Dartmouth Flood Observatory providing data on a variety of water-related concerns;79

- The United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) maintain the National Communications Support Programme (NCSP) tools which collect good practices, provide information, share knowledge, and seek to build networks to aid adaptation efforts.80

- There are also professional resources that retained experts can rely upon, such as American Society of Civil Engineers publications,81 and civil engineering firms that have developed expertise in sophisticated risk assessments and mitigation measures.82

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75 FEMA, National Flood Hazard Layer (Official), http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=cb088e7c8704464aa0fc34eb99e7f30 (last visited on Nov. 16, 2015). This tool can help identify flood risks that impact transportation and workforce commuting routes that become highly relevant in the event of extreme rainfall or flooding events.
79 World Resources Institute, Aqueduct, http://www.wri.org/our-work/project/aqueduct (last visited on Nov. 16, 2015). Aqueduct also allows users to select water risk factors such as drought, ground water stress, and upstream storage, all of which could be relevant to continuity and adaptation planning.
81 See E.g. MICHAEL BEER, ET. AL., VULNERABILITY, UNCERTAINTY, AND RISK QUANTIFICATION, MITIGATION, AND MANAGEMENT, CDRM 9 (2014) (containing 290 peer-reviewed papers on recent significant advances on this topic).
82 See E.g. Odeh, supra note 69 (demonstrating a comprehensive approach and risk assessment).
DoD employees, including military personnel, may access the Defense Installations Spatial Data Infrastructure (DISDI) Program. This is an enterprise geospatial visualization tool which displays the best available map layers depicting DoD real property assets with selected data. Environmental and weather related layers include FEMA National Flood Hazards, aquifers, and watershed boundaries. This enables users to create a specific operating picture for defense installations and activities.

All of the cited web-based tools currently allow organizations to better understand climate risks at no cost. It is reasonable for organizations to identify tools with the most relevant information for its use and incorporate it into existing continuity plans. Moving beyond tracking historical events, it is possible to model future weather events. Like all technology, the usefulness of enhanced climate risk models will increase with investment and commitment. Relevant projections for risks in the United States are in the National Climate Assessment.

4.2 National Climate Assessment

The Global Change Research Act of 1990 requires certain federal entities, chiefly the Department of Commerce, to produce a National Climate Assessment. The 2013 Charter of the National Climate Assessment includes the following:

Analyzes the effects of current and projected climate change...in a regional context...;

Analyzes current trends in global change...and projects major trends for the subsequent 20 to 100 years;

Is a continuing, inclusive National process that synthesizes relevant science and information about changes in...the Nation’s climate...;

Supports climate-related decisions by providing an information base in multiple formats....

These objectives are squarely focused on evaluating enhanced climate risks. The 2015 Charter of the Advisory Committee for the Sustained National Climate Assessment incorporated these objectives with the following addition: “Addresses risk-based vulnerabilities for business and industry related to the impacts of weather and climate variations and changes.” The synthesized data in the National Climate Assessment provides an overview of possible regional concerns as opposed to projections that could pose specific risks for local projects. This is due in part to the continued maturing of how to best evaluate enhanced climate risks. Still, the current Assessment provides regional concerns and serves as a comprehensive overview of emerging risks to local areas in specific regions. Continuity planners can couple this information with local severe weather events that have actually impacted infrastructure and operations. This approach will produce a better understanding of risks that are relevant to a specific region and general risk trends for local areas. The Assessment is a culmination of many stakeholder efforts and an indication of the many available planning resources.

Many resources produced in affiliation with the National Climate Assessment are centrally located in the “NCAnet Toolkit.” This collection provides state-specific projections of enhanced climate risks under “Regional Reports and Assessments.” State assessments are downloadable and can be incorporated into continuity plans as a short attachment or by reference. The toolkit also includes industry specific material like reports on how enhanced climate risks will impact civil engineering and telecommunications projects. With so many resources available, there is a tremendous opportunity to

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88 Id.
90 Peter Adams, et.al., *Climate Risks Study for Telecommunications and Data Center Services*, Riverside Technology, Inc. (2014).
consider how to synergistically use the information to scale resilience and adaptation efforts.

4.3 Unity of Effort

The tools described above offer access to information that has national, regional, and local relevance. Although technology exists to centralize this large swath of data into a useful interface, there is not yet a database that maximizes the collective wisdom of these efforts. A chorus of thoughtful recommendations encourage federal agencies to simply digitize and organize existing assessments to produce exponential efficiency and quality of new assessments. 91 The cited sources highlight the challenge federal agencies have experienced in assessing environmental issues in a consistent and efficient manner. 92 With increasing attention on enhanced climate risks, there is hope that technological efficiency will meet the sea of completed assessments and those to come.

Unity of effort is a familiar concept within federal entities. 93 As applied to enhanced climate risks, unity of effort means that federal agencies will have the same assessment requirements, use the same criteria, and produce information that can easily be used by other federal entities. As with other federal information like the National Climate Assessment, the information will also be available and used by non-federal entities. There are simple steps all federal agencies could implement for free to gain unity of effort in

92 See Id.
93 Joint Chiefs of Staff, Joint Pub. 3-0, Doctrine For Joint Operations (Sep. 10, 2001) (using the phrase “unity of effort” 49 times); Matthew K. Wilder, Achieving Unity of Effort, 3(1) INTERAGENCY J. 40 (Winter 2012) (describing unity of effort in terms of a “whole-of-government strategy as a key enabler to operations that were once the exclusive purview of [a single government entity]”); H. Steven Blum and Kerry McIntyre, Enabling Unity of Effort in Homeland Response Operations, U.S. ARMY WAR COLLEGE STRATEGIC STUDIES INSTITUTE (2012) (explaining how unity of effort in the context of domestic disaster relief).
These steps include using model protocols, a standard format like the World Bank report tool, and an accessible digital database to store the records. It has never been easier to create unity of effort given the recent focus on making it easier to share assessment data and meet new federal assessment requirements. These recommendations align with the U.S. Global Change Research Program efforts to implement strategic goals that include a process to produce sustained assessments. Its aim is to “facilitate continuous and transparent participation of scientists and stakeholders across regions and sectors, enabling new information and insights to be synthesized as they emerge.” These federal executive branch efforts will enable federal agencies to comply with the National Environmental Policy Act (NEPA) requirement to include climate adaptation and resilience assessments as part of environmental assessments. Notwithstanding the struggles federal agencies have had meeting NEPA requirements, unity of effort will enable federal agencies to meet assessment standards, prevent litigation challenging NEPA assessments, and save money. Federal agencies are not alone in their efforts.

95 See supra text accompanying note 72 https://climatescreeningtools.worldbank.org; “start screening” and “select project type”
100 See Council on Environmental Quality, The National Environmental Policy Act, A Study of Its Effectiveness After Twenty-five Years, at 7 (1997) (noting federal agency leader sentiment that “NEPA takes too long and costs too much, agencies make decisions before hearing from the public, documents are too long and technical for many people to use, and training for agency officials at times is inadequate.”).
Federal guidance to plan for enhanced climate risks is consistent with state, local, and private industry efforts. For example, the Superstorm Sandy Rebuilding Task Force will produce federally funded regional and local assessments. Some states maintain NEPA-type assessment requirements as well as a few large local governments. In addition, climate risk assessments have been accomplished in some form for other states and local areas independent of a legal mandate. Private entities like the Con Edison utility company are conducting climate risk assessments and resiliency plans to protect operations. With a growing number of assessment efforts, now is the time to realize the potential of central storage and information sharing of assessment data. There remains untapped potential to apply new technology to synthesize all that is known of enhanced climate risks and continue humanity’s legacy of sustained existence.

102 See report cited supra note 100 noting federal agency sentiment that NEPA requirements are too expensive.
104 Wentz, supra note 94, at Table 2.0 (noting Massachusetts, New York, and Washington statutes).
105 Id. (noting New York City and King County, Washington requirements).
108 With a recommendation for mass sharing of data, it is appropriate for CEQ to provide guidance that federal agency and federally funded contractor assessments be produced in a form that enables immediate public disclosure. This will relieve agencies of the administrative burden responding to Freedom of Information Act (5 U.S.C. §552 (2015)) requests. Assessments that include information exempt from release can publically post redacted or summarized reports. See 6 U.S.C. §133 (2015) (exempting certain critical infrastructure information from disclosure) and 10 U.S.C. §130e (2015) (same).
109 See E.g. PLANATIR, https://www.palantir.com/ (last visited Dec. 5, 2015) (cited to demonstrate the existence of a mission-focused software company dedicated to working for the common good and possessing software designed to maximize the usefulness of complex data, a growing challenge to address climate risks).
5. CONCLUSION

Efforts to prevent and mitigate climate risks gain momentum each day. Much progress has been made and will continue. These efforts will save lives, reduce suffering, and protect property. Existing laws and regulations requiring continuity planning ensure governmental entities will act prudently to mitigate risks and operational disruptions.

Our world is growing smaller with interconnection and mutual reliance. Technology creates both increased risks and opportunities. There is overwhelming collective ability to identify and mitigate climate risks. Continuity plans provide a path to move in that direction with immediate benefits. The gathered data will enable projects to more easily incorporate enhanced climate risks into adaptation discussions as part of environmental assessments and other uses.

Planning for enhanced climate risks will bring immediate benefits to organizations in the form of increased awareness of climate risk trends, increased competence of personnel to identify and plan for risks, and increased operational resilience. The benefits of planning for enhanced climate risks far outweigh the costs given the vast free resources available. The time is now for continuity planning to incorporate enhanced climate risks to create a more resilient society and sustainable future.