



INSTITUTE FOR DEFENSE ANALYSES

A Framework for Climate Security (Poster)

Jennifer L. Bewley
Alec C. Wahlman
Gifford J. Wong

November 2021

Approved for public release;
distribution is unlimited.

IDA Document NS D-32881

Log: H 21-000438

INSTITUTE FOR DEFENSE ANALYSES
4850 Mark Center Drive
Alexandria, Virginia 22311-1882



The Institute for Defense Analyses is a nonprofit corporation that operates three Federally Funded Research and Development Centers. Its mission is to answer the most challenging U.S. security and science policy questions with objective analysis, leveraging extraordinary scientific, technical, and analytic expertise.

About This Publication

This work was conducted by the Institute for Defense Analyses Central Research Program, Project C2265 “IDA Climate Security Initiative - Phase II.” The views, opinions, and findings should not be construed as representing the official position of either the Department of Defense or the sponsoring organization.

For More Information

Jennifer L. Bewley, Project Leader
jbewley@ida.org, 703-845-2390

Leonard J. Buckley, Director, Science and Technology Division
lbuckley@ida.org, 703-578-2800

Copyright Notice

© 2021 Institute for Defense Analyses
4850 Mark Center Drive, Alexandria, Virginia 22311-1882 • (703) 845-2000.

This material may be reproduced by or for the U.S. Government pursuant to the copyright license under the clause at DFARS 252.227-7013 (Feb. 2014).

A Framework for Climate Security

Dr. Jennifer Bewley, Dr. Alec Wahlman, Dr. Gifford Wong
(Institute for Defense Analyses)



The complexity of climate change makes crafting a response difficult

- Impacts a vast span of human activity
- Includes many complex interrelationships

Organizations within the DoD need help thinking about the implications of a changing climate

We have developed a climate security framework that aids stakeholder decision-making in climate security



Department of Defense Climate Risk Analysis, Oct 2021, p. 6.

Climate security—the intersection of climate change and national security

Technical Approach – Framework Design & Application

- First, break down climate into specific changes to the ***physical environment***
 - Changes were drawn from authoritative sources on climate change [i.e., Fourth National Climate Assessment (2018) and the Intergovernmental Panel on Climate Change’s Sixth Assessment Report (2021)]
 - Alternate design – include *human reactions* to climate change (e.g., migrations)
- Then cross-map those changes to DoD’s 7 “joint functions” (per Joint Publication 3-0)
 - E.g., fires, intelligence, sustainment
- Grade effect of each interaction on joint function, leveraging subject-matter expertise
 - None, minor (1pt), moderate (2pt), major (4pt) impact on the respective joint function
 - Tally scores for each joint function and climate change

Changes to the Physical Environment

Changes to the Air

- Higher air temperature and humidity
- Shifting precipitation patterns
- More severe storms and tornados
- Stronger hurricanes with more rapid intensification

Changes to the Land

- More wildfires
- Expanded range for diseases
- Thawing Permafrost
- Shrinking ice sheets on land
- Increased coastal erosion

Changes to the Oceans

- Rising sea level
- Changing ocean currents
- Changing ocean salinity, pH, and temperature
- Decreasing sea-ice extent

Results - Comparison Table for DoD's 7 Joint Functions

Climate Change Effects		Joint Functions							
Minor impact on operations (1 point)	1	Command and Control	Information	Intelligence	Fires	Movement/Maneuver	Protection	Sustainment	Score
Moderate impact on operations (2 points)	2								
Major impact on operations (4 points)	4								
Changes to the Air	Higher air temperatures and humidity		1			2		1	4
	Shifting precipitation patterns (droughts, heavy rain/snow)		1	1		2		2	6
	More severe storms or tornadoes		1	1				1	3
	Hurricanes (e.g., stronger, more rapid intensification)		1	1		2		2	6
Changes to the Land	More wildfires		1	1	1	1	1	1	6
	Expanded range for diseases			1				1	2
	Shrinking ice sheets on land			1				1	2
	Thawing permafrost		1	1		1		2	5
	Increased coastal erosion		1	1		1		1	4
Changes to the Oceans	Rising sea level							1	1
	Changing ocean currents			1		1		1	3
	Changing ocean salinity, pH, and temperatures			1	1		1		3
	Decreasing sea-ice extent	1		2	2	4	2	2	13
Score		1	7	12	4	14	4	16	

- Climate changes generating the highest impact scores:
 - Decreasing sea-ice (13)
 - Hurricanes (6)
 - More wildfires (6)
- Joint functions most impacted across the span of climate changes
 - Sustainment (16)
 - Movement/maneuver (14)
 - Intelligence (12)

Lessons Learned and Next Steps

- Breaking down climate change and DoD operations into their respective components, and then comparing them, can yield valuable insights
- Such a comparison can illuminate promising topics for more in-depth assessments
- While we focused on DoD operations, other impacts could be assessed:
 - DoD installations
 - Allies, partners, and hostile nations

Additional Resources

A Framework for Climate Security (IDA Document D-22833)(Sep 2021)

Report on the Impact of Climate Change on Migration (White House)(Oct 2021)

Climate Change and International Responses Increases Challenges to US National Security Through 2040 (NIC)(2021)

Department of Defense Climate Risk Analysis (OSD) (Oct 2021)

Contact Information

Dr. Jennifer Bewley: jbewley@ida.org

Dr. Alec Wahlman: awahlman@ida.org

Dr. Gifford Wong: gwong@ida.org

REPORT DOCUMENTATION PAGEForm Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE November 2021		2. REPORT TYPE FINAL		3. DATES COVERED (From-To)	
4. TITLE AND SUBTITLE A Framework for Climate Security (Poster)				5a. CONTRACT NUMBER HQ0034-14-D-0001	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Bewley, Jennifer L. Wahlman, Alec C. Wong, Gifford J.				5d. PROJECT NUMBER CRP 2265	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Institute for Defense Analyses Systems and Analyses Center 4850 Mark Center Drive Alexandria, VA 22311-1882				8. PERFORMING ORGANIZATION REPORT NUMBER IDA Document NS D-32881	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Institute for Defense Analyses Systems and Analyses Center 4850 Mark Center Drive Alexandria, VA 22311-1882				10. SPONSOR/MONITOR'S ACRONYM(S) IDA	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) Resource Conservation and Resiliency program area has supported a broad portfolio of research intended to help maximize mission readiness. Our research finds that there is unlikely to be a single climate security framework capable of serving the variety of needs and perspectives within the DoD. As a result, we develop an approach for creating frameworks that could help undergird future readiness assessments. We believe this approach can help further SERDP/ESTCP's mission by supporting more structured and informed decision-making within the DoD enterprise. In 2019, the Institute for Defense Analyses began developing an internally funded interdisciplinary climate security capability within its cadre of research personnel. One output from that effort was the recognition that decisions relative to the consequences of climate change for the DoD need to start with a broad structure. IDA found the following structure useful: impact on installations, impact on operations, other climate-related demands placed on DoD, and climate impacts on foes/allies/partners. Within the operations domain alone, there are many valid perspectives based on the kinds of decisions that require support. As a prototype demonstration, we drilled down in operations by mapping 13 direct physical effects of climate change to the doctrinal taxonomy for the 7 joint functions of DoD operations. Of the seven joint functions, we find that intelligence, movement and maneuver, and sustainment will likely be the most heavily impacted, by the spectrum of changes to the physical environment. From the perspective of the environmental changes, decreasing sea ice stands out as the most disruptive across the joint functions. Together, this approach could be used for prioritizing additional investigation and investments in technology or infrastructure capable of supporting DoD operations.					
15. SUBJECT TERMS Climate Change; climate change assessments; Climate Security; extreme weather; Joint Functions					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT Uncl.	b. ABSTRACT Uncl.	c. THIS PAGE Uncl.			Buckley, Leonard J.
			SAR	7	19b. TELEPHONE NUMBER (include area code) (703) 578-2800