Commander's Guide

to Climate Adaptation for DoD Natural Resource Managers

Naval Information Warfare Center PACIFIC

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Commander's Guide available at: https://www.denix.osd.mil/nr/CommanderAdaptationGuide
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Cover: Heightened wildfire risks from climatic changes, such as warmer temperatures and prolonged drought, can result in restrictions on live-fire training and testing (Joint Base Elmendorf-Richardson). Photo: Alejandro Pentildea/USAF.

Photo below: Climatic changes, including sea-level rise and intensified coastal storms, may complicate installation efforts to manage threatened and endangered species such as the California least tern. Photo: Mark Pavelka/USFWS.

Adaptation planning can help installation natural resource managers prepare for and reduce climate vulnerabilities and risks. Photo: Joint Base Lewis-McChord Public Affairs Office.

INTRODUCTION

Over the coming decades, Department of Defense (DoD) installations will experience significant risks from climate-related changes in the environment, which could compromise the capacity of these lands and waters to support the military mission. This *Commander's Guide* is designed to help military leadership better understand how climate impacts to DoD natural resources can pose risks to training and testing capabilities, and how natural resource managers can plan for these risks to enhance installation resilience and sustain military readiness.

Temperatures across the United States already have increased an average of 1.8°F, with Alaska warming at nearly twice that rate. The decade 2010–2020 was the hottest in recorded history, and the five warmest years on record all have occurred since 2015. A changing climate already is affecting DoD natural resources and presenting new challenges for managing species and ecosystems. For instance, as climatic conditions shift it may become more difficult and costly for installations to sustain populations of some threatened and endangered species. Changing conditions may also lead to declines in other plants and animals, increasing their risk of extinction and making them eligible for legal protection under the Endangered Species Act.

Installation managers will likely be confronted with new resource challenges, including the spread of newly problematic species, such as invasive plants or insect pests that serve as human disease vectors. Climatic changes may also complicate or diminish the effectiveness of current installation management practices. For example, increasing drought and aridity may constrain the ability to conduct prescribed burns, a cornerstone of ecosystem management on many installations.

This Commander's Guide is designed to help military leadership enhance installation resilience and sustain military readiness.

Rising temperatures and long-term drought are increasing wildfire risks across the West. The 2014 Tomahawk fire on Naval Weapons Station Seal Beach Detachment Fallbrook forced evacuations from neighboring Marine Corps Base Camp Pendleton. Photo: Lance Cpl. Joshua Murray/USMC.

IMPLICATIONS FOR MILITARY MISSION AND READINESS

The effects of a changing climate on an installation's natural resources can have spillover impacts on its military mission and capabilities, including implications for training, testing, and operational readiness. Natural resource-related climate risks to military readiness can include:

Suitability of Training Sites. Climate impacts on an installation's natural resources can reduce the physical availability of suitable training and testing areas. Beach areas, for example, are crucial for practicing amphibious assaults but can be highly vulnerable to sea-level rise, stronger hurricanes, and heightened storm surge. Climate-driven ecological changes may also alter habitat conditions, for example, the conversion of forests to grasslands, undermining the ability of training sites to meet a given training objective.

Limitations on Timing of Training. Increased drought and drying of natural vegetation can heighten fire risk, resulting in increased restrictions on live-fire training. In other instances, increases in flooding, erosion, and permafrost melt may limit access to training areas and compromise the ability of troops to maneuver.

Damage to Facilities and Operational Assets. Climate-related impacts to natural systems, such as floodplains, wetlands, and dunes, can diminish the ability of these systems to provide protective benefits to facilities and other military assets, increasing their risks from flooding and storm surge. Increases in wildfire frequency and severity also pose growing risks to personnel, facilities, and other infrastructure at many installations.

Regulatory Compliance and Restrictions. A changing climate may complicate or impede regulatory compliance, such as endangered species conservation and wetlands protection, resulting in increased costs and/or training restrictions. An impaired ability to meet regulatory requirements could compromise the capacity to use certain lands and waters for operations and training.

Rising sea levels pose a risk to operations and wildlife at low-lying installations such as Naval Air Station Key West. Photo: Senior Master Sgt. Andrew J. Moseley/Air National Guard.

Rapidly melting permafrost in Alaska is transforming arctic ecosystems and destabilizing infrastructure and installation assets (Yukon Training Area, Fort Wainwright). Photo: 1st Lt. James Gallagher/Army.

Shifting climatic conditions may compromise the ability of DoD managers to meet endangered species recovery goals and could lead to new regulatory constraints. Photo: USFWS.

INRMPs are the foundational documents for installation natural resource management (Andersen Airforce Base, Guam). Photo: Tech. Sgt. Shane A. Cuomo/USAF.

To reduce climatic risks, adaptation will often require proactive management, including expanded use of prescribed burns (Joint Base Lewis-McChord). Photo: Scott Hansen/Northwest Guardian.

Climatic changes already are disrupting key biological processes and can affect traditional land uses and management activities.

Warming temperatures and other climatic changes will increasingly affect DoD natural resource management efforts. The ratio of female to male sea turtle hatchlings, for example, is largely determined by sand temperature during incubation (Santa Rosa Island Range, Eglin Air Force Base). Photo: Ilka Cole/USAF.

ADDRESSING CLIMATE RISKS TO DOD NATURAL RESOURCES

DoD has a long and successful history of managing its natural resources in ways that support the military mission, meet legal obligations, and achieve broader conservation goals. **Integrated Natural Resource Management Plans** (INRMPs) serve as the guiding documents for how installation natural resources are maintained and managed in support of ecosystem and mission sustainability. While these plans must address a wide range of natural resource–related issues, a changing climate is emerging as a significant new challenge for sustaining DoD natural resources.

Climatic changes already are disrupting key biological processes and leading to shifts in species ranges, breeding seasons, and migratory pathways. A changing climate is also affecting the composition, structure, and health of many ecosystems, for example, leading to the conversion of some forests to grasslands. Climatic changes also can amplify the impact of existing stresses, such as invasive species, wildlife diseases, and water pollution and scarcity. In turn, climate impacts to natural resources can alter or constrain many of the traditional land uses and management activities on installations, including forestry, hunting and fishing, and other forms of outdoor recreation.

To respond to the increasing risks that climate change poses to DoD natural resources, the Integrated Natural Resource Management Plan (INRMP) Implementation Manual (DoDM 4715.03) specifically calls for installations to address climate considerations when updating or revising their INRMPs. In support of that directive, in 2019 DoD issued *Climate Adaptation for DoD Natural Resource Managers,* an in-depth guide to preparing for and reducing installation climate risks through the INRMP planning and implementation process. This *Commander's Guide* draws on and summarizes key adaptation concepts and approaches offered in that more detailed guide.

Asking the right questions is key to successful adaptation planning. Photo: Airman 1st Class Joshua R. M. Dewberry/USAF.

KEY CLIMATE CONSIDERATIONS FOR COMMANDERS

Military leadership plays an important role in guiding and supporting installation sustainability and resilience efforts. The following questions can help commanders and other military leaders ensure that climate risks are appropriately addressed in installation natural resource planning and management efforts.

- What climate-related concerns may affect your installation, such as: intensified storms, heavier precipitation, and flooding; rising sea levels, higher storm surges, and accelerated coastal erosion; melting permafrost; and increased drought and elevated wildfire risk?
- How might climatic changes affect your installation's natural resources, including protected resources (endangered species, wetlands), ecosystem services (flood protection, water supply, recreation), and natural habitats used for training and testing?
- How might training, testing, and other installation functions be impacted by climate-related risks to your installation's natural resources?
- Does your installation's INRMP already address potential effects of a changing climate, or is there a need to incorporate climate considerations into the next update or revision?
- Are natural resource adaptation and resilience needs and approaches reflected in other key plans, including your installation's Master Plan?
- Are there local, regional, or landscape-scale partnerships that could help your installation's managers in understanding, planning for, and responding to climate-related risks?
- Is there a need to modify or refine approved natural resource projects to reduce climate risks, or are new adaptation-focused projects or approaches needed to enhance installation resilience?

UNDERSTANDING CLIMATE ADAPTATION

Climate adaptation generally refers to efforts to prepare for, manage, and reduce the impacts and risks resulting from a changing climate. DoD's Climate Change Adaptation and Resilience Directive (DoDD 4715.21) formally defines climate adaptation as the process of "adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects."

Adaptation can best be understood as a process of **iterative risk management.** Based on an understanding of observed and projected climate-related changes, managers can assess climate vulnerabilities to an installation's natural resources, along with any resulting risks to mission capabilities and assets. Appropriate strategies and actions can then be developed and implemented as a means of reducing mission risks, sustaining installation natural resources, and meeting legal obligations for environmental protection. Because climatic changes are ongoing, assessment of climate-related risks, as well as associated adaptation plans, will need to be revisited and updated on a periodic—or iterative—basis.

Climate adaptation also shares common ground with two foundational elements of DoD natural resource management: **ecosystem management** and **adaptive management.** Indeed, the need for managing resources based on an overall systems approach—ecosystem management—and the importance of adjusting conservation practices based on ongoing monitoring and learning—adaptive management—are central to the practice of climate adaptation.

The following four overarching principles for "climate-smart conservation" have emerged as an important underpinning for effective adaptation, and inform the detailed adaptation guidance provided to DoD natural resource managers:

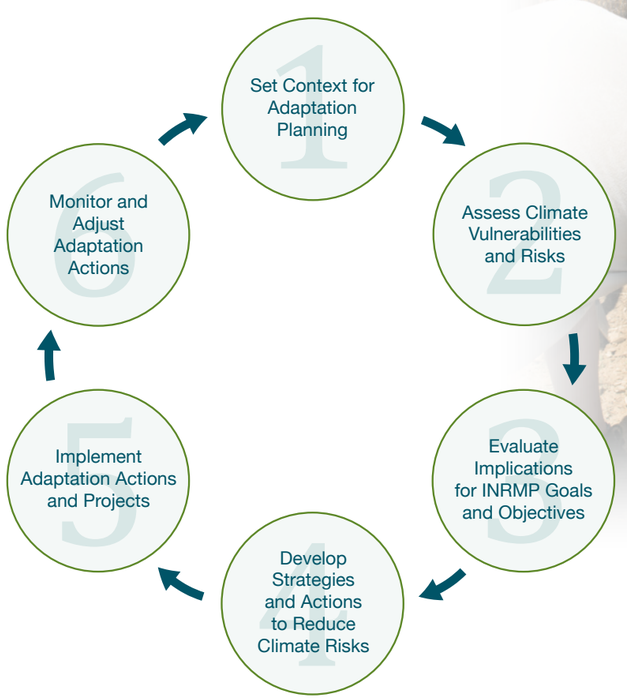
- Act with intentionality; link actions to climate risks
- Manage for change, not just persistence
- Reconsider management goals, not just strategies
- Integrate adaptation into existing work

Southern black racer and camouflaged sniper (Eglin Air Force Base). Photo: Staff Sgt. William Frye/Army.

INRMP ADAPTATION PLANNING PROCESS

Incorporating climate considerations into an installation's natural resource program will be key to sustaining mission functions and requirements that depend on installation lands, waters, and other resources. Fortunately, best practices for adaptation planning are consistent with and build on existing DoD guidance for INRMP development and ecosystem management. The *Climate Adaptation for DoD Natural Resource Managers* guide lays out a six-step INRMP adaptation planning process that provides a structured means for installation managers to prepare for and respond to climate risks in ways that can sustain natural resources, maintain military mission, and meet legal obligations.

The INRMP adaptation planning process is supported by a set of detailed step-by-step worksheets designed to support application of the framework by installation resource managers. Importantly, this six-step framework is intended as an aid, not a mandate. Additionally, depending on installation-specific needs and available expertise, time, and budget, this planning process can be modified and applied at various levels of detail and intensity.



Six-Step INRMP Adaptation Planning Process

Understanding the climate vulnerability of installation resources serves as the basis for designing effective adaptation actions and projects (Travis Air Force Base). Photo: Heide Couch/USAF.

The INRMP adaptation planning process offers a structured means to prepare for and respond to climate risks.

The INRMP adaptation planning process is designed to help both managers and leadership:

- Understand potential impacts and risks that climatic changes may pose to the installation's natural resources and to mission requirements and sustainability
- Consider the implications of climate-related changes for achieving current and planned INRMP goals and management objectives
- Identify priority adaptation projects and actions—whether new projects, current projects, or adjustments to existing projects—for inclusion in the INRMP implementation table

The INRMP adaptation planning process can highlight opportunities for natural systems to protect installation assets from climate-related risks (Naval Air Station Oceana). Photo: Paul Block/Navy.

The INRMP implementation table provides a concise summary and rationale for projects to be carried out under an approved INRMP and serves to inform installation programming and budgeting, including through the Program Objective Memorandum (POM) process. For this reason, ensuring that projects capable of reducing key climate risks are incorporated into the INRMP implementation table is a crucial outcome of the adaptation planning process.

Overview of INRMP Adaptation Planning Process

Step 1. Set Context for Adaptation Planning
- Conduct program scoping
- Assemble planning team/engage stakeholders
- Compile background information

Step 2. Assess Climate Vulnerabilities and Risks
- Project future conditions
- Assess vulnerability of target natural resources
- Assess resulting impacts and risks to military mission

Step 3. Evaluate Implications for INRMP Goals and Objectives
- Evaluate continued achievability of existing goals
- Update climate-compromised goals and objectives

Step 4. Develop Strategies and Actions to Reduce Climate Risks
- Identify potential adaptation strategies and actions
- Evaluate the effectiveness/feasibility of possible strategies
- Select priority risk reduction measures

Step 5. Implement Adaptation Actions and Projects
- Identify project requirements and dependencies
- Incorporate actions/projects into INRMP implementation table

Step 6. Monitor and Adjust Adaptation Actions
- Define expected results of adaptation strategies
- Monitor project effectiveness and ecological responses
- Adjust actions and plans as needed

Modifications or refinements of existing INRMP projects may be needed to account for future climatic conditions (Fort McCoy). Photo: Scott T. Sturkol/Army.

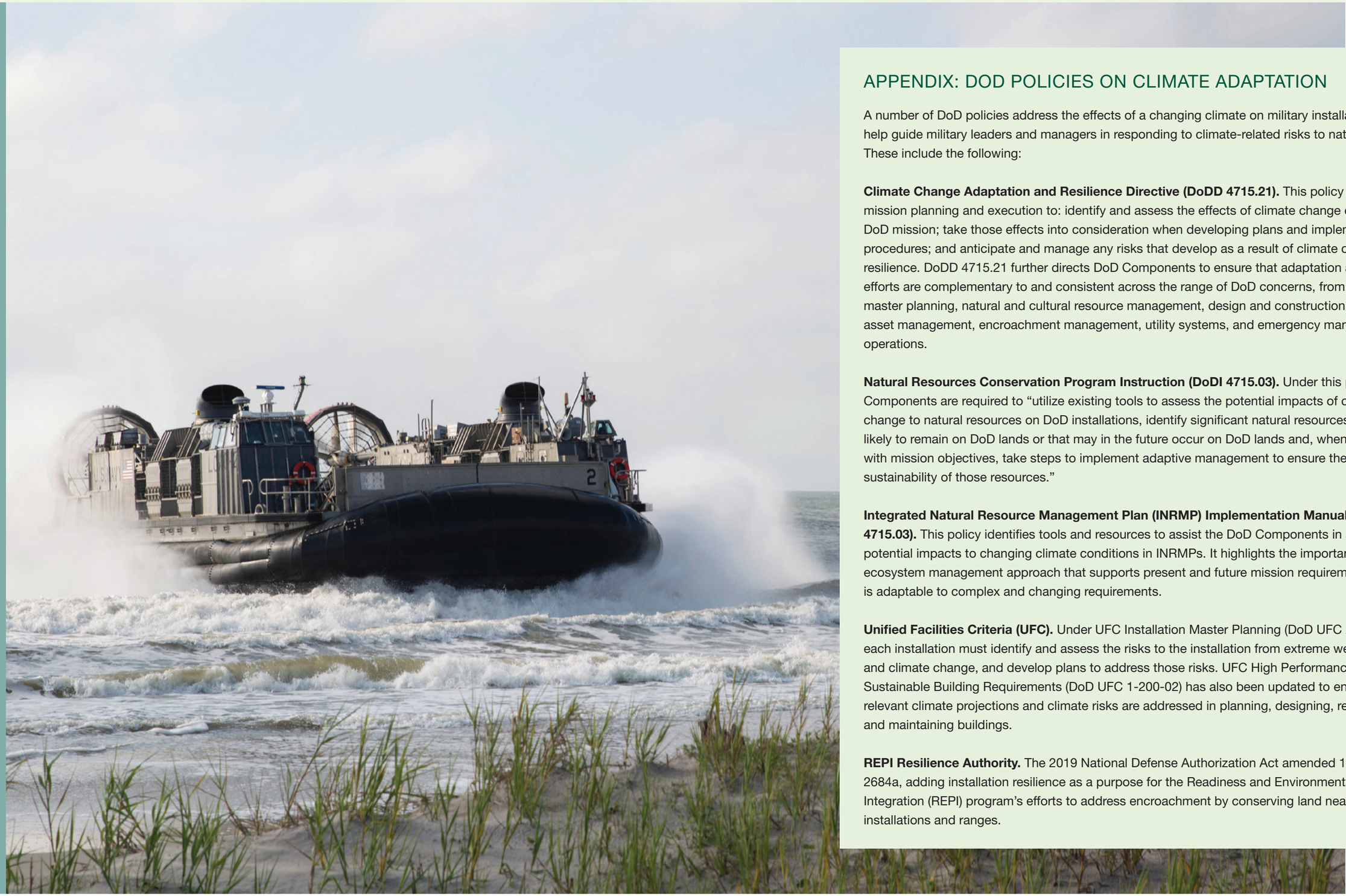
Incorporating climate considerations into INRMPs helps ensure installation sustainability and military readiness by preparing for growing climate-related risks (U.S. Air Force Academy). Photo: Carol Lawrence/USAF.

ENHANCING RESILIENCE, MAINTAINING READINESS

Sustaining DoD natural resources will depend on our ability to understand and manage increasing climate risks. *Climate Adaptation for DoD Natural Resource Managers,* which is summarized in this *Commander's Guide,* offers an introduction to the emerging discipline of climate adaptation and its application in DoD within the context of INRMP planning and implementation. The full adaptation guide offers an overview of relevant climate science, summarizes major climate impacts to installations, and offers a selection of high-quality literature and other information resources useful to DoD managers. Because INRMP "program elements," which range from endangered species management and outdoor recreation to forestry management, are an important framework for installation management efforts, the guide provides insights and resources for understanding how climatic changes may affect the various program elements. The guide also lays out the basic process for adaptation planning, including assessment of climate vulnerabilities and design of strategies to reduce associated risks, and offers suggestions and options for incorporating climate considerations into the structure and substance of the INRMP document. Finally, the guide provides a six-step adaptation planning process for evaluating climate-related risks and crafting strategies and actions to address impacts that could compromise installation functioning and readiness.

Installations across the country face various climate concerns and management challenges, and there is no one-size-fits-all approach for climate adaptation. However, by helping installation leadership and managers understand the principles and processes underlying effective adaptation planning, this guide will serve as an important tool for enhancing installation resilience and maintaining military readiness.

Understanding the principles underlying effective adaptation will serve as an important tool for maintaining military readiness.



Rising sea levels and increasingly severe storms are among the climate-related risks to DoD natural resources that can affect the ability of installations to support training and testing (Marine Corps Base Camp Lejeune). Photo: Lance Cpl. Brianna Gaudi/USMC.

APPENDIX: DOD POLICIES ON CLIMATE ADAPTATION

A number of DoD policies address the effects of a changing climate on military installations and help guide military leaders and managers in responding to climate-related risks to natural resources. These include the following:

Climate Change Adaptation and Resilience Directive (DoDD 4715.21). This policy calls for mission planning and execution to: identify and assess the effects of climate change on the DoD mission; take those effects into consideration when developing plans and implementing procedures; and anticipate and manage any risks that develop as a result of climate change to build resilience. DoDD 4715.21 further directs DoD Components to ensure that adaptation and resilience efforts are complementary to and consistent across the range of DoD concerns, from installation master planning, natural and cultural resource management, design and construction standards, asset management, encroachment management, utility systems, and emergency management operations.

Natural Resources Conservation Program Instruction (DoDI 4715.03). Under this policy, DoD Components are required to "utilize existing tools to assess the potential impacts of climate change to natural resources on DoD installations, identify significant natural resources that are likely to remain on DoD lands or that may in the future occur on DoD lands and, when not in conflict with mission objectives, take steps to implement adaptive management to ensure the long-term sustainability of those resources."

Integrated Natural Resource Management Plan (INRMP) Implementation Manual (DoDM 4715.03). This policy identifies tools and resources to assist the DoD Components in addressing potential impacts to changing climate conditions in INRMPs. It highlights the importance of an ecosystem management approach that supports present and future mission requirements and that is adaptable to complex and changing requirements.

Unified Facilities Criteria (UFC). Under UFC Installation Master Planning (DoD UFC 2-100-01) each installation must identify and assess the risks to the installation from extreme weather and climate change, and develop plans to address those risks. UFC High Performance and Sustainable Building Requirements (DoD UFC 1-200-02) has also been updated to ensure that relevant climate projections and climate risks are addressed in planning, designing, renovating, and maintaining buildings.

REPI Resilience Authority. The 2019 National Defense Authorization Act amended 10 USC § 2684a, adding installation resilience as a purpose for the Readiness and Environmental Protection Integration (REPI) program's efforts to address encroachment by conserving land near military installations and ranges.

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