Climate Change Adaptation Approaches

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US Army Corps of Engineers
BUILDING STRONG®
Climate Concerns for Department of Defense

Vulnerability and Impact Assessment

Adaptation Approaches

DoD Built Infrastructure & Regional Infrastructure Systems

DoD Natural Infrastructure & Regional Ecosystem Health

Defense Missions & Climate Security

Military Operations

Climate Stressors to National/Regional Security

Land Use and Carbon Management

BUILDING STRONG®
Mandated by EO 13514 (10/09).

One of the four priorities is to maintain readiness in the face of climate change.

Addressing Climate Change Risk and Vulnerability: a Three-Phase Approach

- **Phase 1:** Development of a decision framework
  - coordinate with other federal entities

- **Phase 2:** Climate change impact assessments
  - develop analytical methodology and tool guidance for conducting assessments

- **Phase 3:** Climate change adaptation planning
  - robust strategies

New CEQ Implementing Instructions – 4 March 2011
Council on Environmental Quality (CEQ) Guidance

Requirements

- Identify senior agency person responsible for adaptation by 3 Jun 2011
- Conduct high level agency assessment & identify priority actions for 2012 by 30 Sep 2011
- Conduct more detailed agency assessment by March 2012
- Integrate into 2012 Strategic Sustainability Performance Plan (SSPP) by 4 June 2012
Approaching Climate Change Impact Assessment

Traditional approach is to use IPCC general circulation models projections and scenarios (such as for sea level change, above) to determine extent of potential change and uncertainty of this change, and then identify what might be impacted.

Alternative is to understand system sensitivities to changing parameters, and then apply best available climate information to relevant decisions about these systems.

Approaches for Assessment of Climate Change Impacts on DoD Installations

Traditional:
1. General Circulation Models
2. Climate Downscaling
3. System Response
4. Vulnerability/Risk Assessment

Proposed:
1. System Sensitivity to Climate/Weather Factors
2. Decision/Performance Thresholds Relative to Climate Conditions
3. Tailor Available Climate Information to Decision Thresholds
4. Vulnerability as a function of design life and climate-related decision thresholds

(after C. Brown)
Proposal Goals: Determine potential impacts of climate change to Army operations, built infrastructure and natural environment and express these impacts in an assessment framework.

The basis for this framework is a process of “decision-scaling,” which directly maps Army relevant decision processes, operational sustainability, and decision time scales to required climate information. The framework will be applied to a few selected key impacts (e.g., sea level rise, rainfall intensity, drought, temperature change) and affected decision processes in each of the key focus areas: operations, infrastructure and facilities, and natural resources.
Assessment of Impacts

At the enterprise level

- Missions: how will missions be impacted by the impacts of climate change, and how will conditions change in potential (actual) theatre locations?
- Stationing: what mission activities might be compromised at which locations, and how will this impact overall readiness?
- Training: will conditions inhibit training or will perhaps help simulate circumstances in potential theatre contexts?
- Grid uncertainty/reliability: what locations might be impacted – and what adaptation are required to sustain reliable power, and what missions might be compromised with widespread power loss?

At the installation level

- Habitat restoration: longer term habitat restoration projects have long time exposures, and feasibility may be questionable
- Construction projects: increase in cooling degree days, changes in moisture regimes
- Safety for soldiers: exposure to high heat, high humidity may limit in field training in summer season
Relating Sensitivity in Design Parameters to Climate Impacts

“Design Manual”

Climate Change Impacts to Weather Patterns

“Historical Data”

6.1 INTRODUCTION

Adapting drainage systems to the design of highways since it affects the highway's serviceability and stability, including, the pavement’s structural strength. If moving on the traveled way occurs, hydrology becomes an important safety concern. Drainage design involves determining factors that impact run-off and soil erosion. Chapter 6 discusses pertinent sections in the "Design Manual" that address drainage system design, considering climate change impacts to weather patterns.

Chapter Six
Drainage and Stormwater Management

The average 1-hour rainfall intensity expected to be equal or exceeded, on average, once every 25 years is 3.0 in/hr.

Figure 8. Intensity pattern based upon long term average (historical data).
Some Adaptation Considerations

- Budgets are limited today, and will be limited tomorrow – we need good methods that help us understand choices along the time/cost spectrum of changing climatic conditions.
- We are making numerous decisions today about built/natural infrastructure and military operations that are already impacted, or will be impacted, directly or indirectly, by changing climatic conditions. These decisions could become more and more expensive if we delay integrating considerations of these impacts.
- In some cases, the second or third order impacts are the most alarming in terms of costs and disruption for Defense operations, security stressors, and built and/or natural environments.
- A “framework” in needed to align climate impacts and stressors to the “sensitivity” of management, operational and mission decisions to changing climatic conditions – to help focus limited resources.
- This framework should inform existing planning and budgeting processes – not generate another process.
Moving Forward

- Develop Framework
- Assess Impacts and Sensitivities
- Integrate into Strategies, Plans and Budgets
- Adapt and Adjust
- Built linkages across plans

- Disaster Response Planning
- Installation Strategic Plans
- Critical Infrastructure Assessments
- Mission and Unit Stationing Decisions
- Regional Ecosystem Coordination
- Integrated Natural Resources Management Plans
- Facility and Infrastructure Design Guidelines
- National Security Policy
- Capacity Development Strategies
Questions?
Climate Change Forum

- Inter-Agency Climate Change Impacts and Adaptation Forum
  - Meets in DC area 6-8 times/year (phone in participants from across US)
  - Co-chaired by NASA (S. Higuchi) & USACE (W. Goran)
  - Now in 4th year, all presentations on FedCenter
  - Over 30 agencies involved, including many Defense participants.
  - 2011 Forum last sessions: May 4th, next Aug 2nd
    - Blair Feltman, University of Waterloo, Adaptation Approaches in Canada
    - Kevin Knuuti, Sea Level Rise
    - Joe Thompson, GAO, Cost of Climate Change Adaptation
  - Selected 2010 speakers:
    - CAPT Tim Gallaudet – U.S. Navy’s Task Force CC
    - Chris Pyke - U.S. Green Building Council, Designing for a Changing Climate
    - Kathy Jacobs, Director, National Climate Assessment
    - Maria Blair, CEQ Climate Change Adaptation Coordinator

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