



Projects Advancing U.S. Army Sustainable Resource Use

University of Illinois and
ERDC-CERL Collaboration

Opportunities
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US Army Corps
of Engineers



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"Planet Earth" – The Challenges

Life Supporting Resources

DECLINING

RISING

Consumption of life supporting resources

Consequences:

- Mission Constraints
- Public Concerns
- Resource Scarcity
- Degradation of air, land and water
- Reduced well-being
- Competition for resources
- Threats to Security

Sustain the Mission – Secure the Future



Center for the Advancement of Sustainability Innovations - CASI

- Virtual multi-site ERDC capability, created in 2006, with a “hub” at CERL but with many partnerships
- Supporting the Army strategy for sustainability by providing technical support, expertise and innovative capabilities to advance sustainable practices across Corps, Army and Defense operations
- Performing sustainability assessments and audits, facility planning and design assistance, energy conservation and renewable sources analysis
- Assisting Defense and Army organizations to understand material and system consequences of operations and acquisitions



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Sustain the Mission, Secure the Future

Engineer Research and Development Center

CASI Approach

- Focus on emerging challenges
- Provide “head start” for organizations to address these challenges through forums, white papers and studies
- Coordinate and collaborate with key stakeholders, and bring the best team together across multiple organizations
- Address “systems” issues and consequences
- Help military and military partners improve the triple bottom line in all operations and activities



CASI Coordination & Engagement

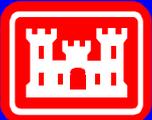
CASI works with many formal and informal groups and forums:

- Inter-Agency Climate Change Impacts Working Group
- Army Sustainability Council
- Installation Sustainability Plans (ISPs)
- AEPI Foresight Consultative Team
- SERDP Sustainable Infrastructure Technology Team
- Corps of Engineers Sustainability Council
- Corps of Engineers Strategic Planning and Actions for Change Forums
- Office of the Secretary of Defense (OSD) Sustainable Ranges Program Forums
- Army Research Office Environmental Sciences Program
- National Defense Center for Environmental Excellence (NDCEE) Technical Advisory Forums



CASI Technology Focus Areas

- **Sustainable Forward Military Operations**
- Sustainable Facilities and Infrastructure
- **Sustainable Water Resources**
- Sustainability Approaches, Education and Knowledge Management
- Ecosystem Services and Natural Capital
- Sustainable Regional Planning
- Sustainable Materials Solutions
- Sustainable Energy Solutions
- Climate Change Impacts



Sustainable Contingency Operations



Operations “within the box”

- Waste Reuse
- Reduction of Inputs (fuel, water, logistics support)
 - Sustainable and safe materials
- Use of indigenous materials and methods



Sustainable Contingency Operations

CASI Engagements Related to Forward Operations

- **Sustainable CONOPS** - with sponsorship of Army Environmental Policy Institute, developing framework for CONOPS science and technology investments
- Working with SERDP & ESTCP, ARO, RDECOM and ERDC to establish **basin systems science** thrust (e.g. forward basing as “system” within Army/Defense systems of systems)
- Supporting TRADOC’s Basecamp Integrated Capabilities Development Team (ICDT) to define capability needs for forward bases
- Developing capabilities to nurture sustainable stability operations through collaborative planning, consequence understanding, and sustainable operations analysis



Formal Process

Technology Shortfall Analysis Method

S&T Roadmap

TRADOC Integrated
Capabilities Development
Team (ICDT)

Informal Responses

New S&T
Programs

Sustainable CONOPS Project

Provides Framework

- To connect existing efforts
- To coordinate expertise
- For roadmap strategies

Ad Hoc Projects

Kitchen & Solid
Waste

Solar
Tents

Zero Footprint
Basecamps

Package
Reduction

Microgrid
Design

Forward Basing Problems

Right timing
Right actions



Sustainable Energy Solutions

Microgrid Related Activities:

- SERDP Statement of Need (ERDC Technical Monitor on Virginia Tech FY08 microgrid design project)
- Ft. Sill microgrid design (with Sandia National Lab) and Ft. Bragg generator integration project
- Microgrids for full spectrum military operations (EM Magazine article, October 2007)
- Microgrid Controls – Small Business Innovative Research (STTR) Solicitation – May 08



Outcomes – Sustainable CONOPS Initiatives

- Framework of Requirements by sector (water, power and energy, waste, logistics)
- Roadmap highlighting:
 - technology readiness relevant to each sector
 - current investments
 - critical gaps

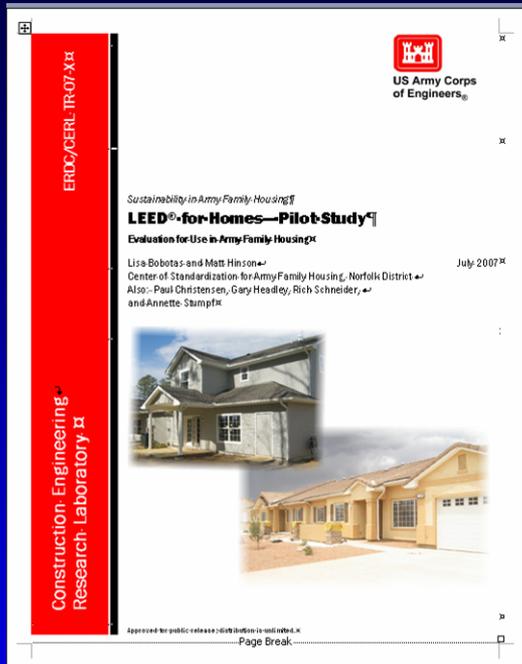


John Moore, Getty Images

With orders not to drink the local tap water, the 10,000 soldiers and support staff at Kandahar Airfield go through nearly 22 million bottles of water a year.



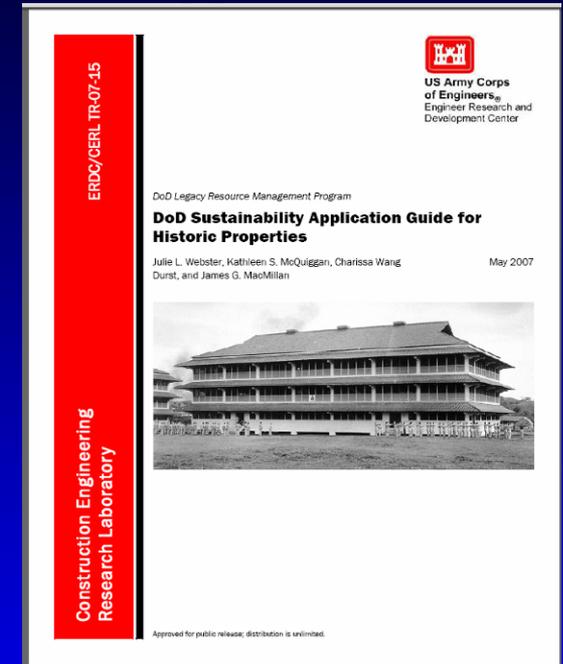
Sustainable Facilities & Infrastructure



LEED for Homes



Sustainable Design for Building Complexes & Watersheds



Sustainable Historic Properties



Providing evaluations, guidance, training and demonstrations related to implementation of sustainable design approaches

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Sustainable Water Resources

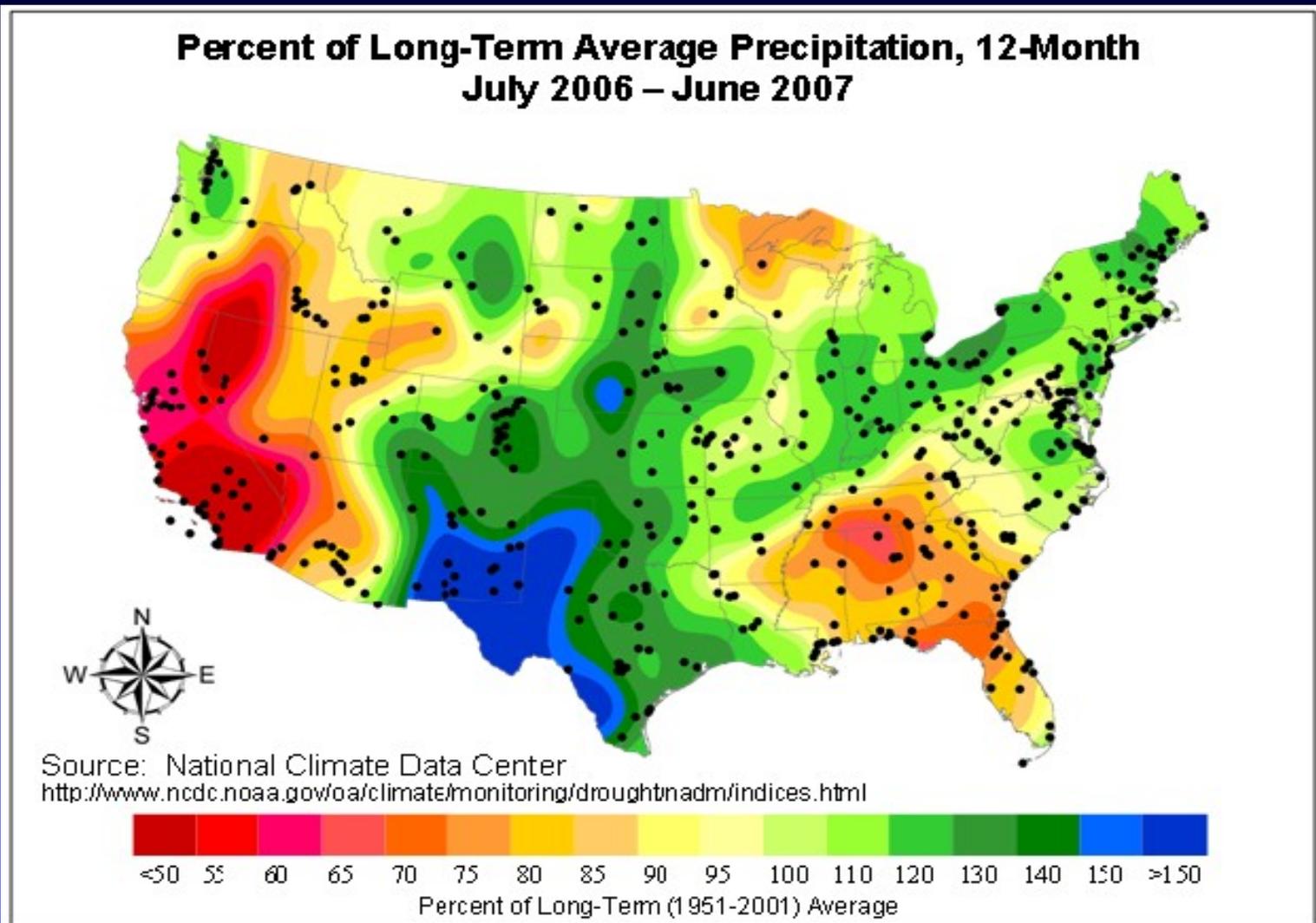
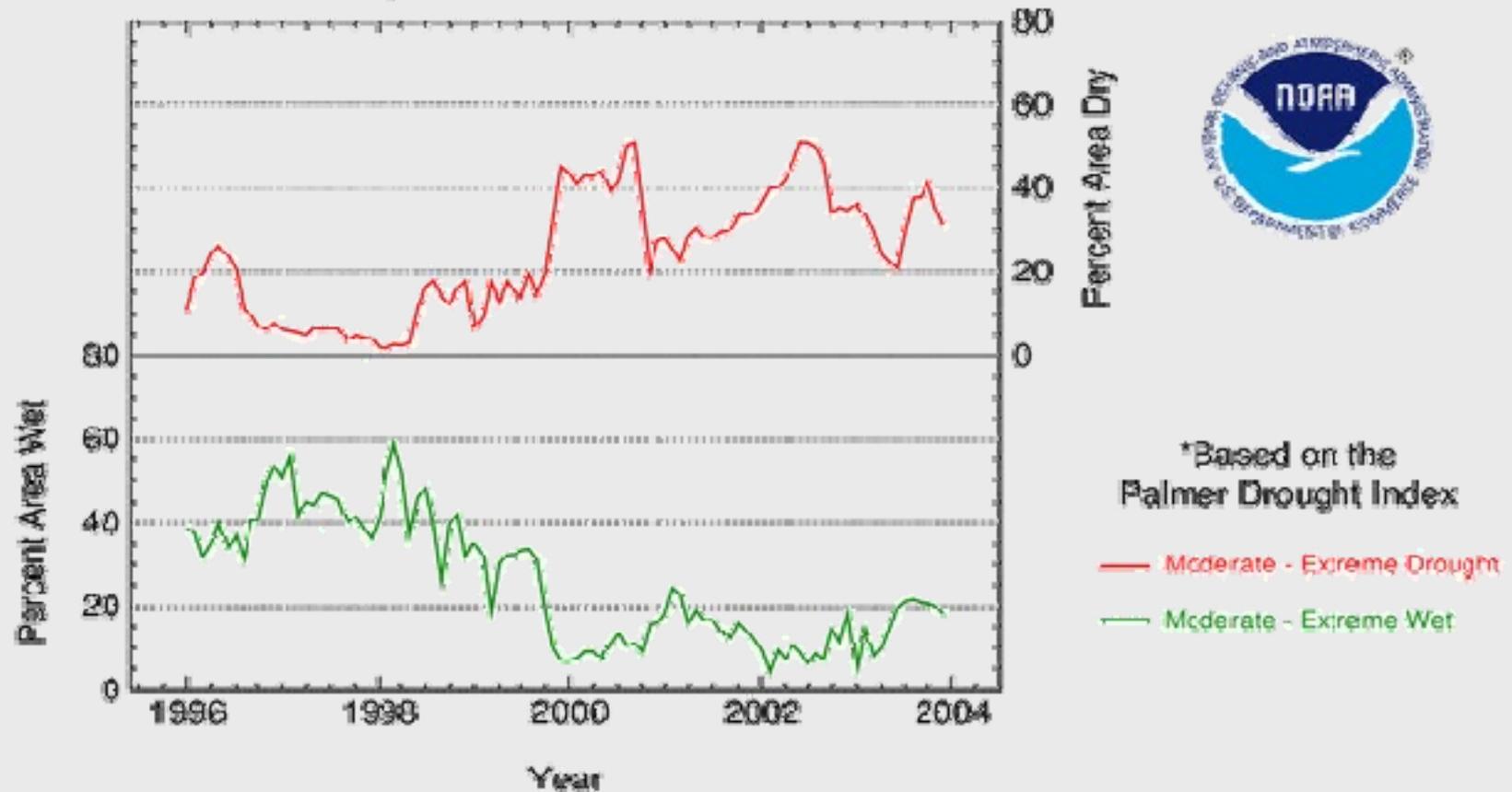


FIGURE 6. Recent precipitation conditions for the CONUS military bases

Drying Up

U.S. Percentage Area Wet or Dry
January 1996 - December 2003

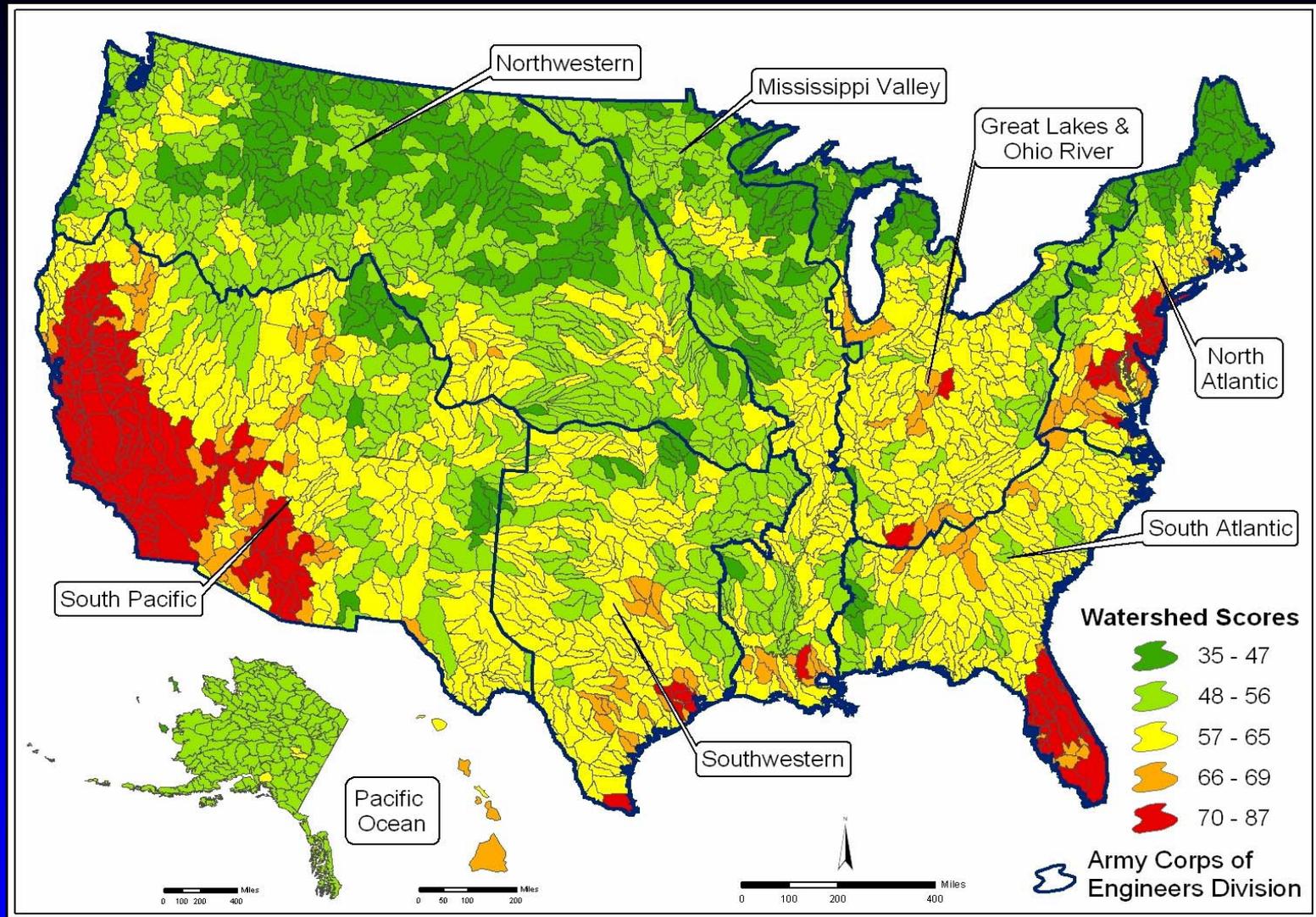


*Based on the
Palmer Drought Index

— Moderate - Extreme Drought

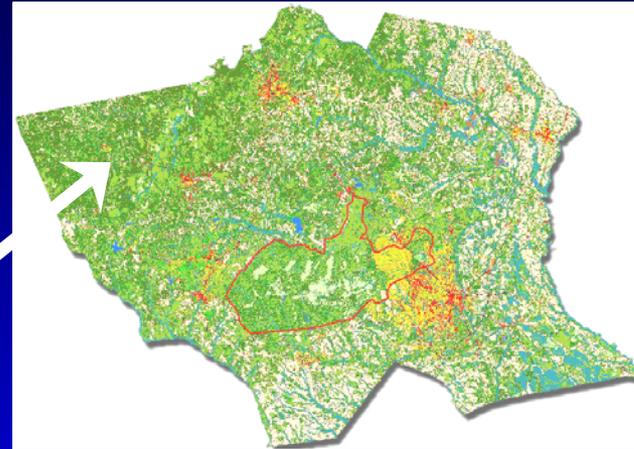
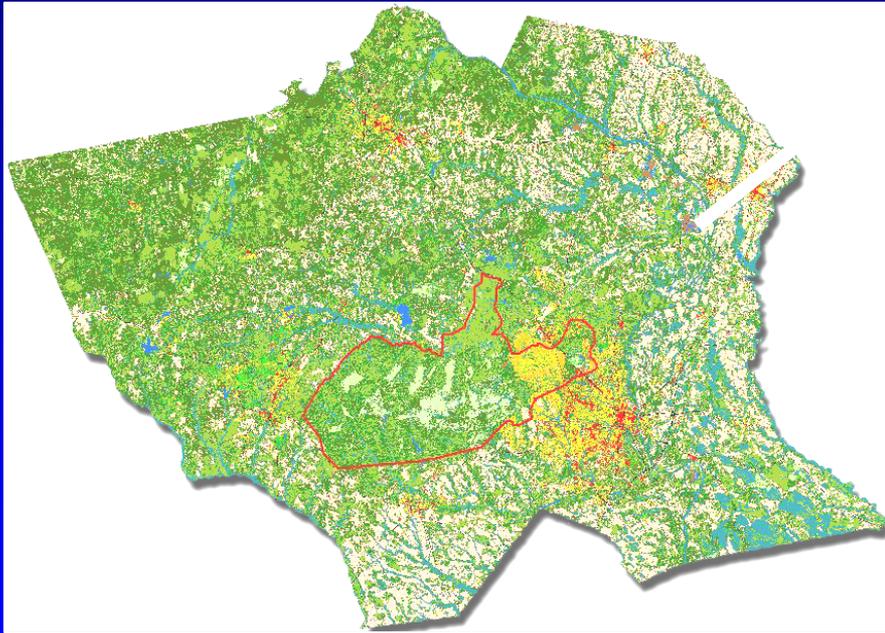
— Moderate - Extreme Wet

National Climatic Data Center / NESDIS / NOAA



Watershed Ranking Using Sustainable Installation Regional Resources Assessment (SIRRA) Tool

Projected Population Change

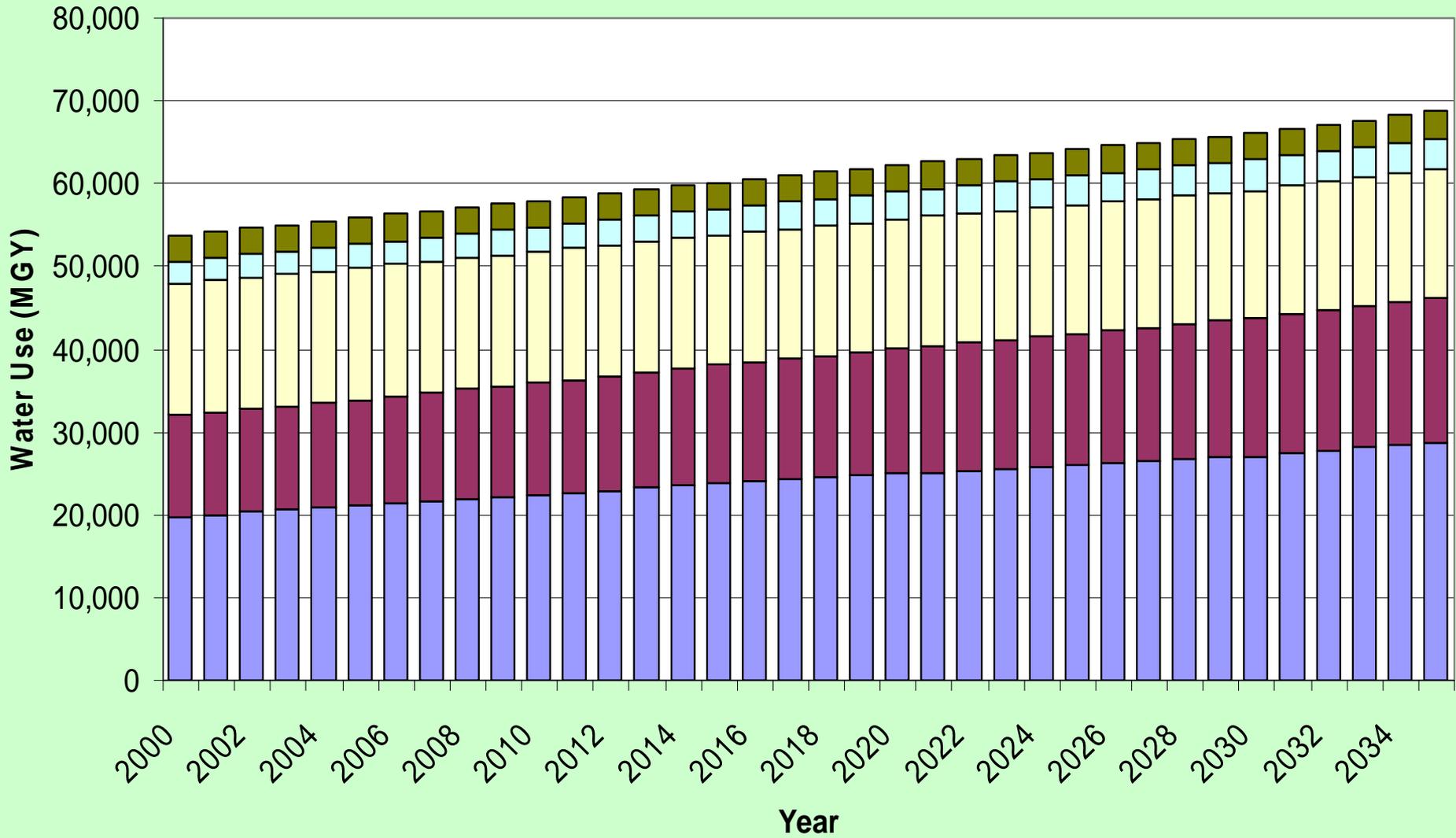


- + 400,000 population
- + 129,000 households
- + 27 million sq. ft. of commercial/industrial
- 21,000 acres of agriculture
- 14,000 acres of forest



Total Water Use - Fort Bragg Region

Residential Comm/Industrial Agricultural Public System Losses Fort Bragg



Water Quantity Interventions

- Fort Bragg Usage (2004)
- Public System Water Loss Control (2010)
- Commercial/Industrial Water Conservation Program (2012)
- Residential Water Conservation Program (2015)
- Agricultural Water Conservation Program (2018)

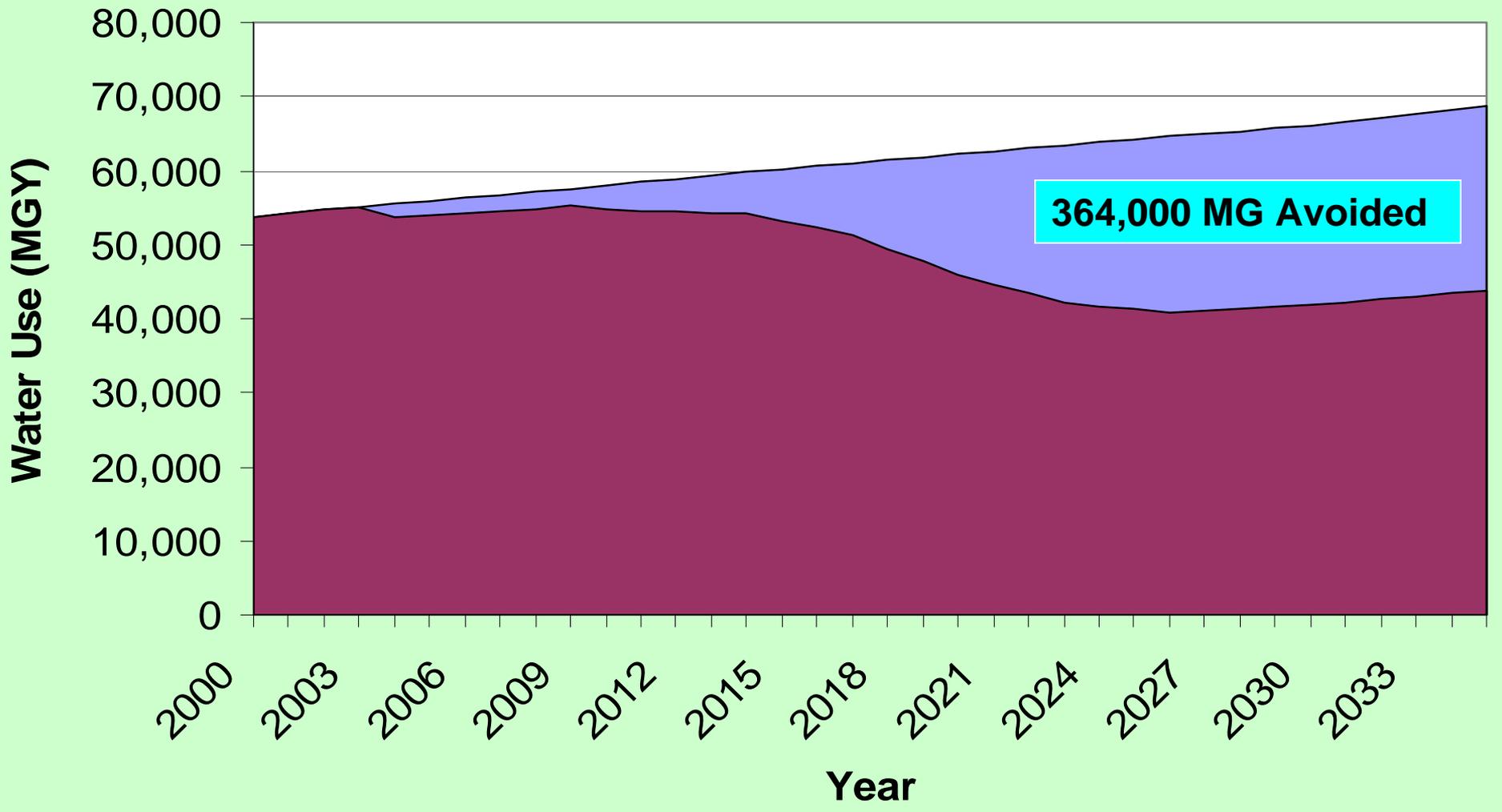
Residential Program:
5% water savings phased in from 2015 to 2023 through upgrades of older homes (toilets, showers, etc), new home requirements after 2015, and rainwater harvesting after 2025.

Agricultural Program:
50% water savings phased in from 2018 to 2026 through efficient irrigation, efficiency upgrades, and recycling.



Fort Bragg Region Water Consumption

Projected Water Withdrawals With Interventions



Integrated Water Cycle Systems Approach

1. Identify site characteristics and interactions with the built environment

2. Conduct a site water balance

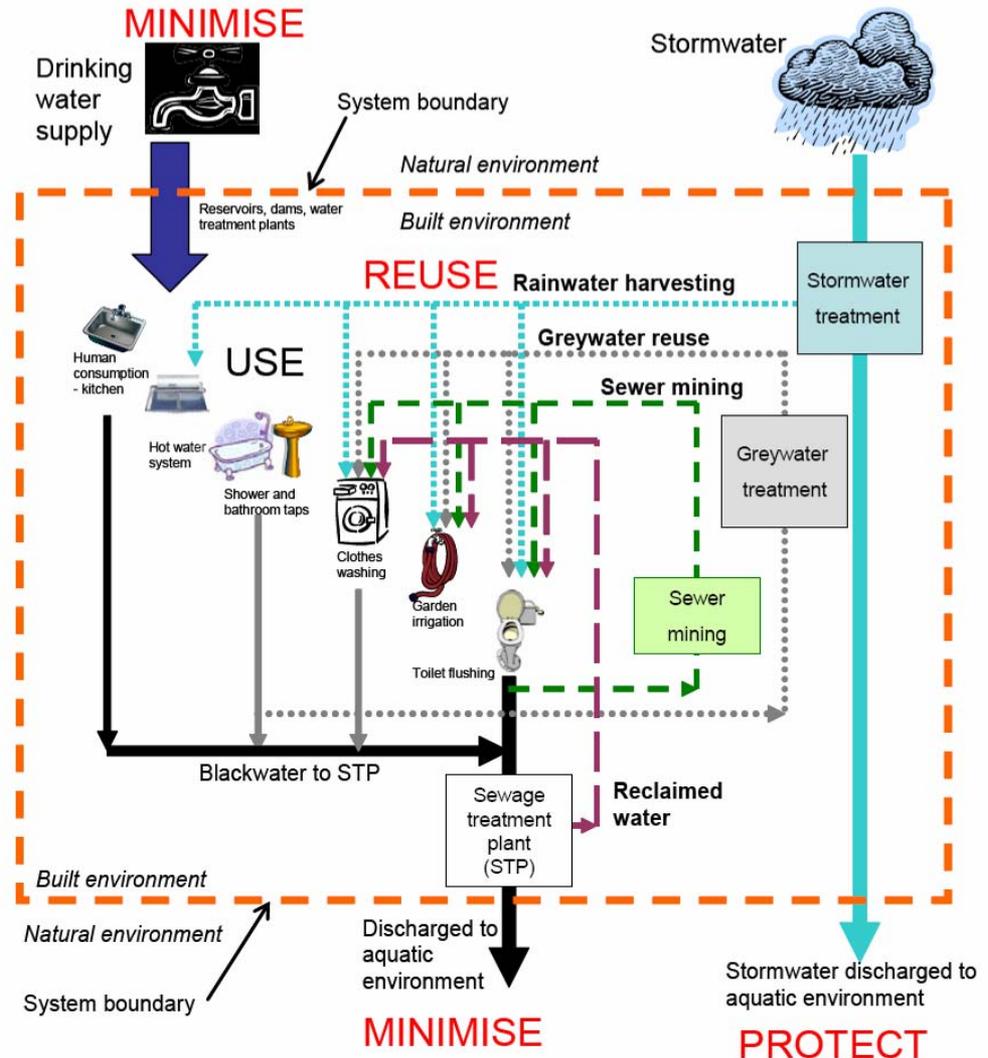
3. Identify water reuse treatment options

4. Social and human health considerations

5. Evaluate the impact on natural environment

6. Life cycle costing evaluation

7. Evaluation of water reuse options



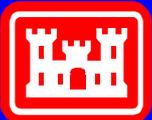
WaterCAMPWS

- Science and Technology Center Awarded late 2002, \$4 m/yr from NSF, \$400k Illinois
- 9 universities, 3 partners, ~120 students, ~50 faculty

Our mission is to develop **revolutionary new materials and systems** to purify water for *human use*.

Our purpose is to educate a diverse body of students and the public in the *value, science, and technology* of water purification.

Dr. Mark Shannon, Director



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Outcomes of Water Initiatives

Water Availability Study

- Regional analysis for continental U.S. (ranking bases upon potential water supply/needs gaps)
- Requests for studies to USGS Water for America
- Installation specific water survey tool, tested at two bases (SE, SW)
- Recommendations for water supply policy options

Water Technology Analysis

- Report on programs investing in water technologies (priorities, projects, plans)
- Workshop on military requirements for advanced water technologies (fixed and forward facilities)
- Plans for technology investments
 - Army Research Office
 - Army Installation Technology Transfer Program
 - Defense Strategic Environmental Research Program (SERDP)
 - Defense Environmental Security Technology Certification Program (ESTCP)



Upcoming CASI Forums

- July 31st, SSA Geo-Portal Demonstration, Washington, North Carolina, Illinois (UI Landscape Architecture and LEAMgroup)
- July 23rd, Installation Futures Forum – Energy Security and Climate Change Scenarios, Crystal City, VA (UI Building Research Council)
- August 21st, 2008 Washington DC : Climate change impact interagency working group
- Sept 3-6 Bristol UK: Militarized Landscapes Conference (Colorado State University)
- November 12-14, Urbana-Champaign, IL: Water technology options for defense operations, (University of Illinois Water CAMPWS , Army Research Office, ERDC, Strategic Environmental Research and Development Program (SERDP))
- Summer 2009, Workshop on Climate Change Impacts on Cold Regions, Anchorage, Alaska (University of Alaska)



Questions?

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