Future of Army Water Studies

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Water Challenges

- Energy/water nexus
- Balancing supply with demand
- Aging infrastructure
- Complex water rights issues
- Cost vs. price imbalance
- Quality degradation
Energy/Water Nexus

- Thermoelectric power
- Geothermal
- Biofuels
- Solar-hot water
- Hydropower
- Carbon Capture
- “Fracking”
Regional Water Balance?

- **Supply**
  - Rivers
  - Aquifers

- **Demand**
  - Installation
  - Public Supply
  - Domestic
  - Industrial
  - Agriculture
Three states use a quarter of U.S. water

Florida, California and Texas lead the country in water usage. The government projects that at least 36 states will face water shortages within five years.

Estimated water withdrawals, in million gallons per day in 2000

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<th>0 to 5,000</th>
<th>5,001 to 10,000</th>
<th>10,001 to 20,000</th>
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Likely to experience water shortage before 2013*

* Colorado and South Carolina are statewide. All other states are regional or local.

SOURCE(S): U.S. Geological Survey; Government Accountability Office
Lake Meade, AZ and NV

Supply
Population Growth

Demand
Aging Infrastructure

- 240,000 water main breaks/year
- 1.7 trillion gal/year lost costing $2.6 B
- American Water Works Association targets 15% for unaccounted water
- Infrastructure report card: D-
- Gap analysis: $263B shortfall by 2020
Complex Water Rights

- Regulated Riparian
- Prior Appropriation

**Legal Allocation of Water:** 48% (shown in purple) of the 50 states allocate water by riparian rights of landowners and 38% (shown in green) by prior appropriation doctrine (the right to use the water). The other states (shown in yellow) have a mix of laws or some other type of authority.
Quality Degradation

Degraded water cannot be considered a viable source.
Long-term Regional Studies with Broad Applicability

- Assess 30-year water supply and demand for sample of Army installations
  - Method developed in 2009 at two pilot studies
  - Applied to 10 domestic and 3 overseas installations

- Fort Bliss, TX
- Fort Bragg, NC
- Camp Shelby, MS
- McAlester AAP, OK
- Fort Benning, GA
- West Point, NY
- Fort Hood, TX
- Fort Carson, CO
- Fort Campbell, TN/KY
- Fort Riley, KS
- Joint Base Lewis-McChord, WA
- Fort Irwin, CA
- USAG Humphreys, Korea
- USAG Grafenwoehr, Germany
- USAG Vicenza, Italy
Fort Carson, CO

- Award winning water conservation program
  - Alternative sources, recycling, and reclamation
- Regional over appropriation of water resources
- Climate change may lead to declines in runoff, higher temperatures, and earlier snowmelt
- Increasing infrastructure costs
USAG Humphreys, South Korea

- Increasing demand
- Fluctuating supply
- Lack of access to relatively abundant water resources
  - Natural patterns of seasonal and regional water distribution
  - Condition of distribution systems
  - Topography

- Water quality
  - Non-point source pollution
  - Wastewater treatment

- Climate change: temperature rise, increased variability of precipitation
General Observations

- Need installation of more water meters
- Water rights may be limiting factors for some installations
- Climate change
  - Exacerbate scarcity in arid regions
  - Effect availability in historically wet regions
- Need aggressive leak detection program
- Regional solutions
Future of Water

- Conflict
- Water security
- Embedded water in the supply chain
- Identification of critical suppliers
  - Components
  - Physical location and water supply/demand
Abrams Tank
Abrams Major Suppliers
Contact Information

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Report will be posted on http://www.aepi.army.mil