Ecoregional & Mission Frameworks for Army Installations

"Sharing Future Space" Conference

Panel – Regional Scale Issues

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The Ecoregional Context of Army Lands

- All installations are NOT created equal with respect to “natural capital/infrastructure”
- The natural environment is the foundational context for sustainability – both in mission and environmental spheres
- An ecoregional context affords a larger spatial framework to assess both mission and environmental requirements

Uses of Bailey's Ecoregion Classification System

- **Developed and expanded by the USDA/Forest Service as the classification system to be used in federal land ecosystem management (1993)**
  - ***Description of the Ecoregions of the United States (1995)***
- **Conserving Biodiversity on Military Lands (1996)**
- **Ecosystem Geography (1996) by Bailey**
- **Ecoregions (1998) by Bailey**
- **Ecoregion-Based Design for Sustainability by Bailey (2002)**
  - ***With reference to Military Lands applications***

Bailey's Ecoregional Classification System

Characterization of the landscape by:

- **Climate**
- **Geomorphology (Landforms)**
- **Lithology/Stratigraphy (Geology)**
- **Soils**
- **Potential Natural Vegetation**
- **Fauna**
- **Surface Water Characteristics**
- **Disturbance Regimes (Land Use)**
- **Cultural**

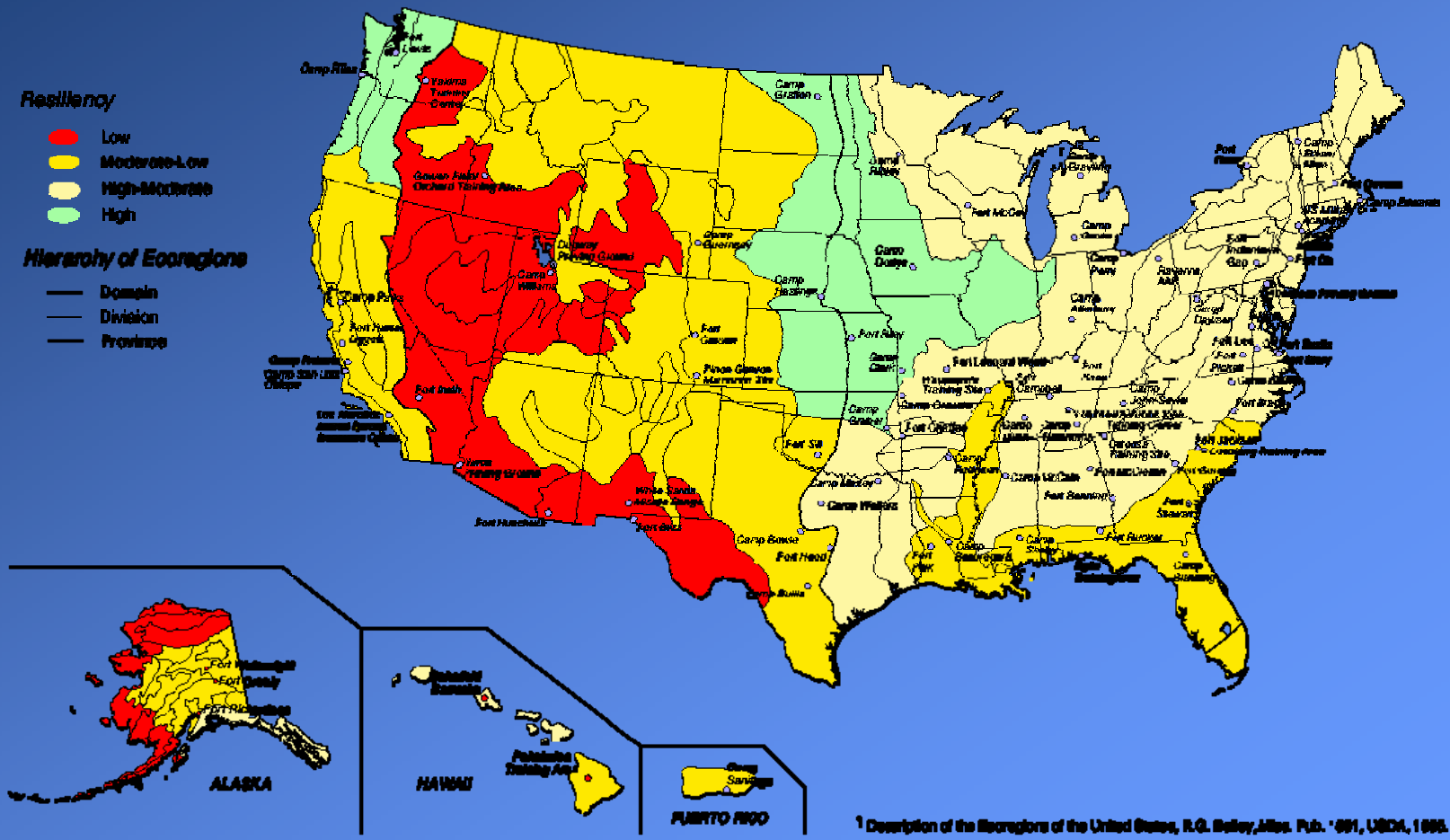
Bailey's Ecoregion Classification System

- Hierarchical System which can be applied at various scales and mapping levels
- 4 levels/categories in the hierarchy:
  - **Domains (4)**
  - **Divisions (15)**
  - **Provinces (52)**
  - **Sections (164)**
- Mountainous regions are distinct due to altitudinal zonation

31 Major Army Installations by Bailey's Ecoregion Classification

Map of Army Lands Resiliency

ARMY INSTALLATIONS BY ECOLOGICAL RESILIENCY CATEGORIES [1]



[1] Description of the Ecoregions of the United States, R.G. Bailey, Misc. Pub. #691, USDA, 1995.

Army Installation Requirements to Support Mission Activities

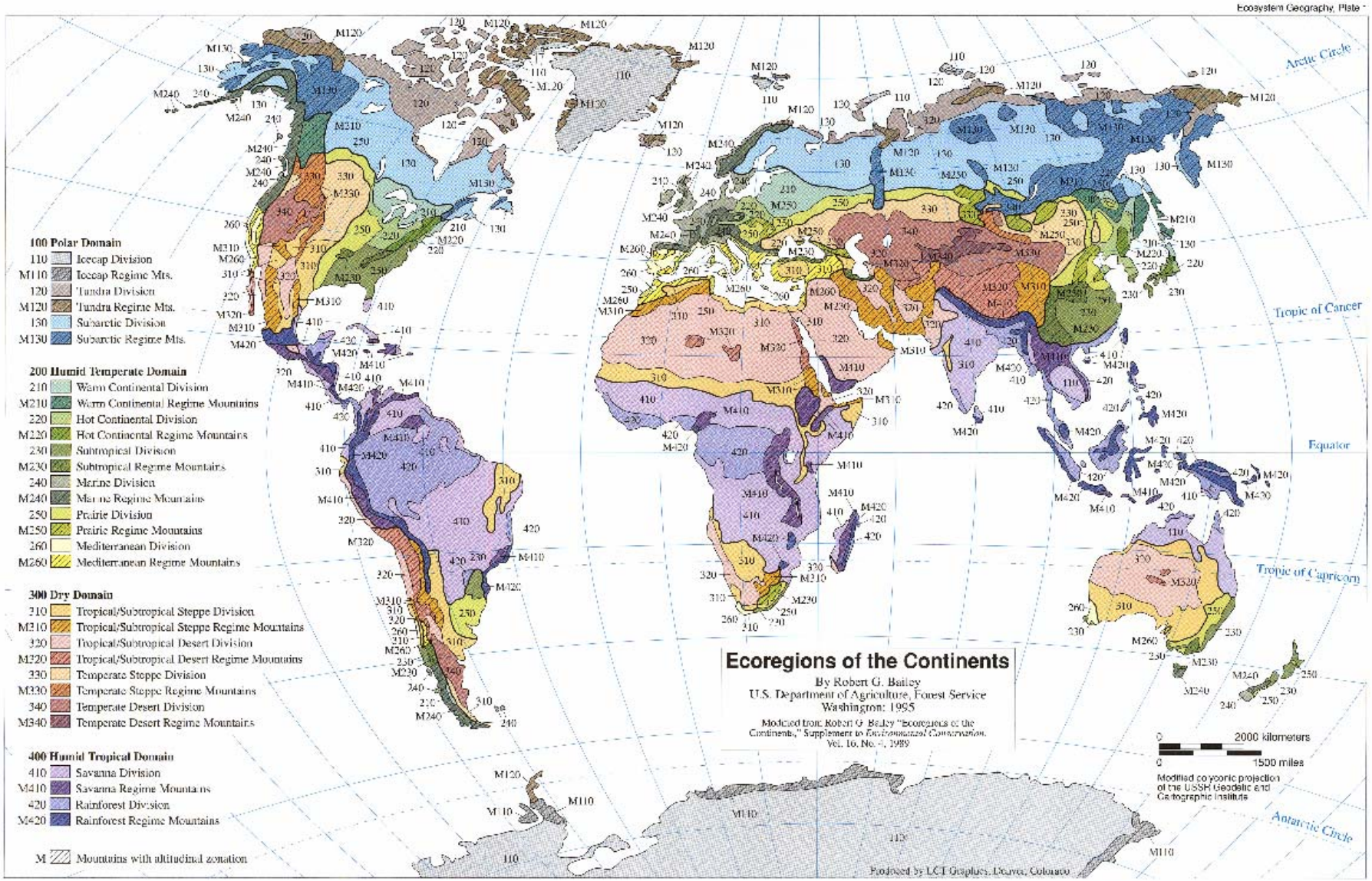
- What is the Army's current land inventory for training and testing ?
  - Geographical distribution
  - Identify the unique physical characteristics of Army lands from a training/testing perspective
  - Critical "one-of-a-kind" assets
  - Relate to requirements for training/testing in operational and threat environments

- What are the Army's future requirements for training and testing lands ?
  - Space requirements
  - Natural environments

Army Mission Requirements – Training and Testing

- Installation Training Capacity (Army G-3, 1999)
  - Range Types and Capabilities
  - Ecological Carrying Capacity/Resiliency
- Active/Inactive Range Inventory (Army G-3, 2000 – 2002)
  - GIS database of ranges
- Natural Test Environments Characterization (ATEC, Yuma PG, 2000 -)
  - Temperate, Desert, Tropical, Cold Regions

Bailey's Ecoregions of the Continents

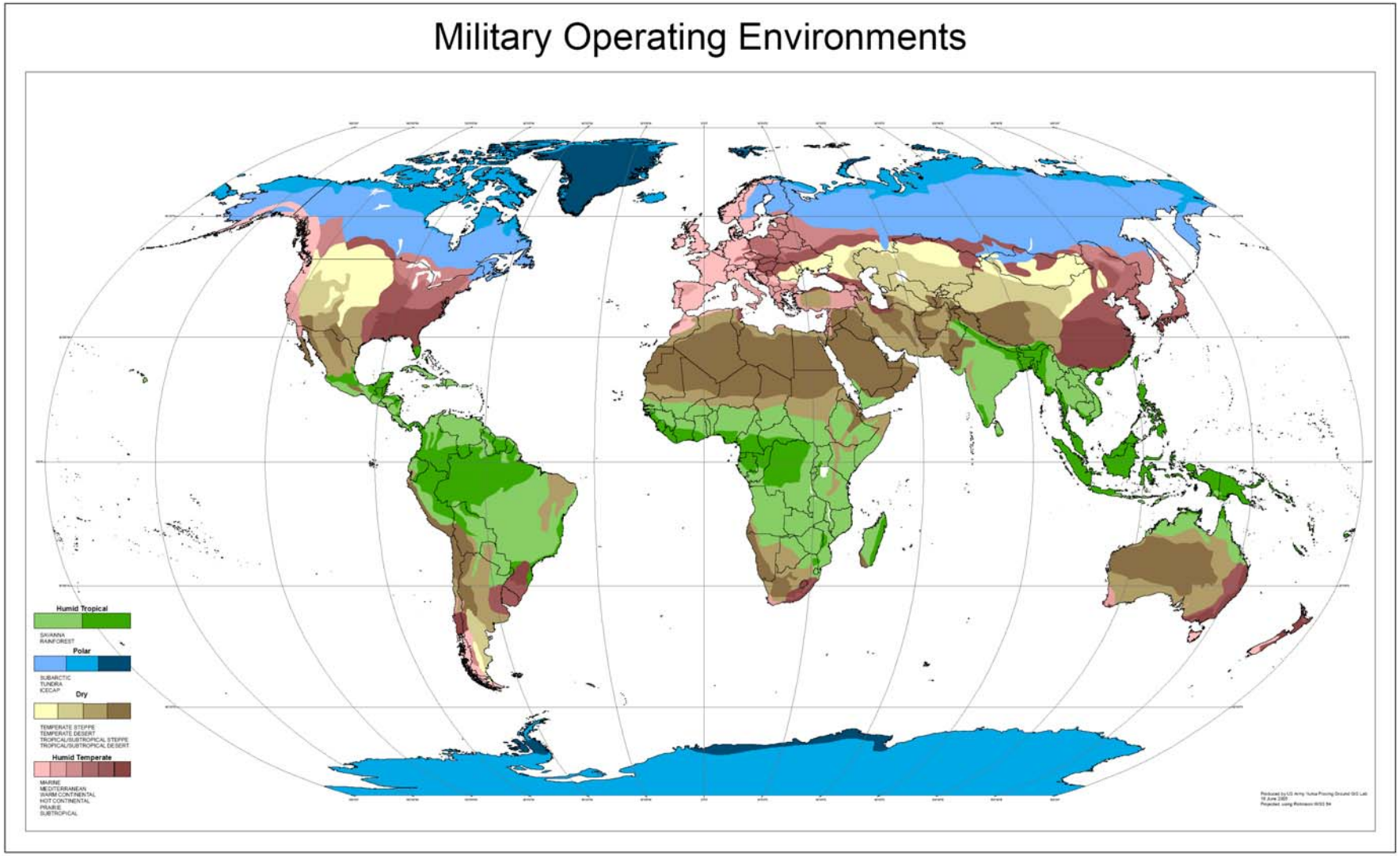


Global Distribution of Ecoregions

Percentage of Land Area:

Domain classification	global land area (%)	MOE	global land area (%)
Humid Tropical	27.5	Rainforest	9.8
		Savanna	17.7
Dry	33.0	Temperate Desert	4.3
		Temperate Steppe	2.0
		Subtropical Desert	13.4
		Subtropical Steppe	10.2
Humid Temperate	15.8	Mediterranean	1.9
		Prairie	4.0
		Marine	2.5
		Subtropical	3.6
		Hot Continental	1.5
		Warm Continental	2.3
Polar	16.7	Subarctic	12.6
		Tundra	4.1

Operational Analogs – Bailey's Ecoregions



Army Installations - Classification by Bailey's Ecosystems

Sub-tropical (9)

Bragg, Stewart, Polk,
Benning, Rucker,
Jackson, Gordon, Aberdeen,
A.P. Hill

Sub-tropical Steppe (2)

Hood, Sill

Temperate steppe (2)

Carson, Pinyon Canyon

Tropical/Sub-tropical desert (5)

Irwin, Bliss, Yuma
Huachuca, White Sands

Army Installations - Classification by Bailey's Ecosystems

Temperate Desert (2)

Yakima, Dugway

Hot Continental (4)

Campbell, Drum,

Knox, Leonard Wood

Rainforest (2)

Schofield, Pohakuloa

Marine (1)

Lewis

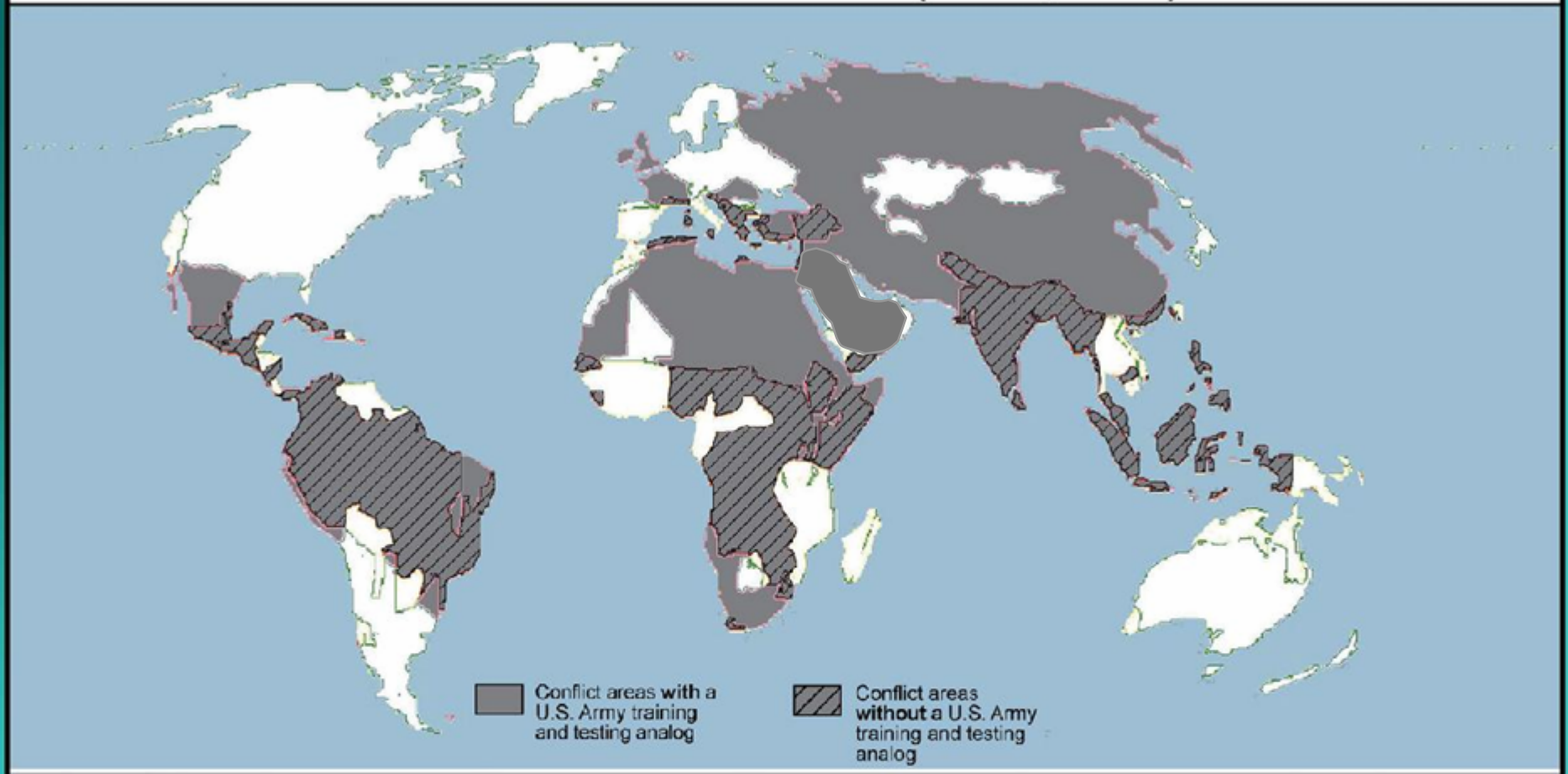
Prairie (1)

Riley

Sub-arctic (3)

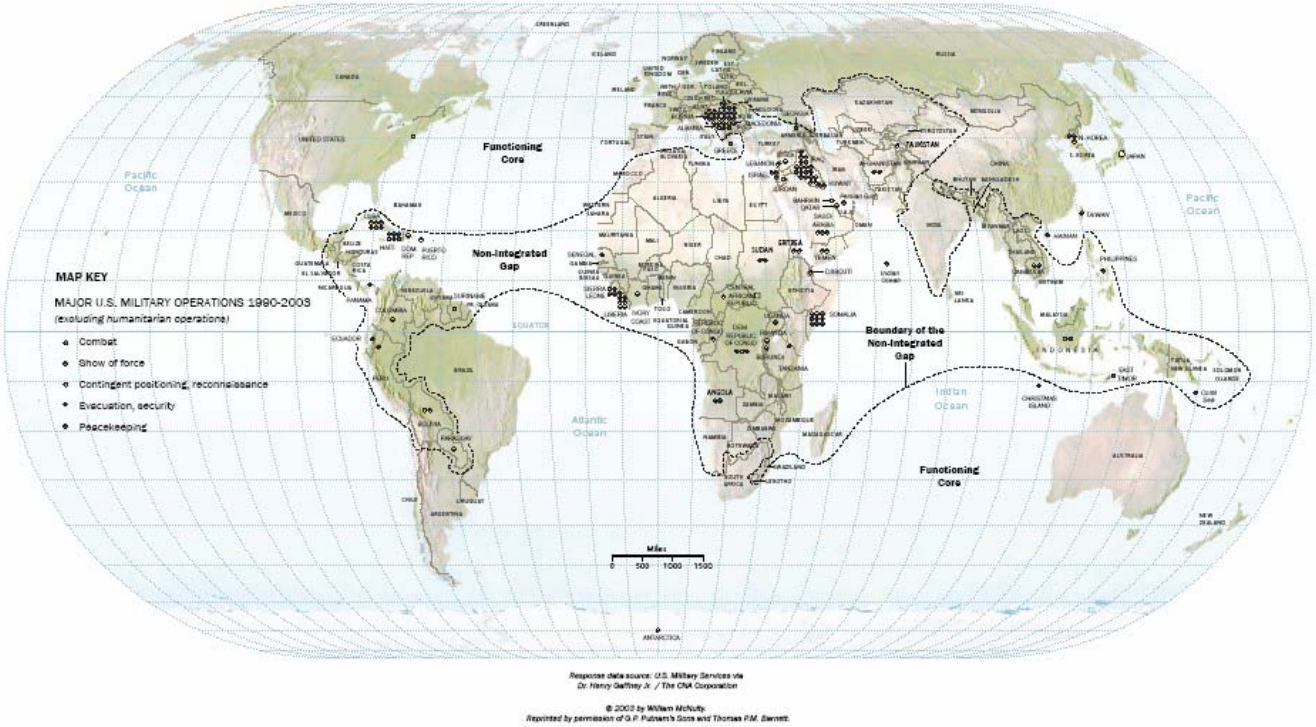
Richardson, Wainwright, Greely

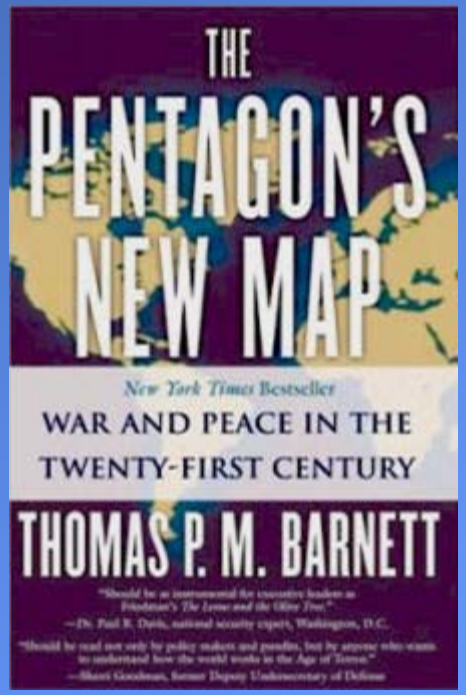
Conflict Areas of the World (NDCF, 1999)



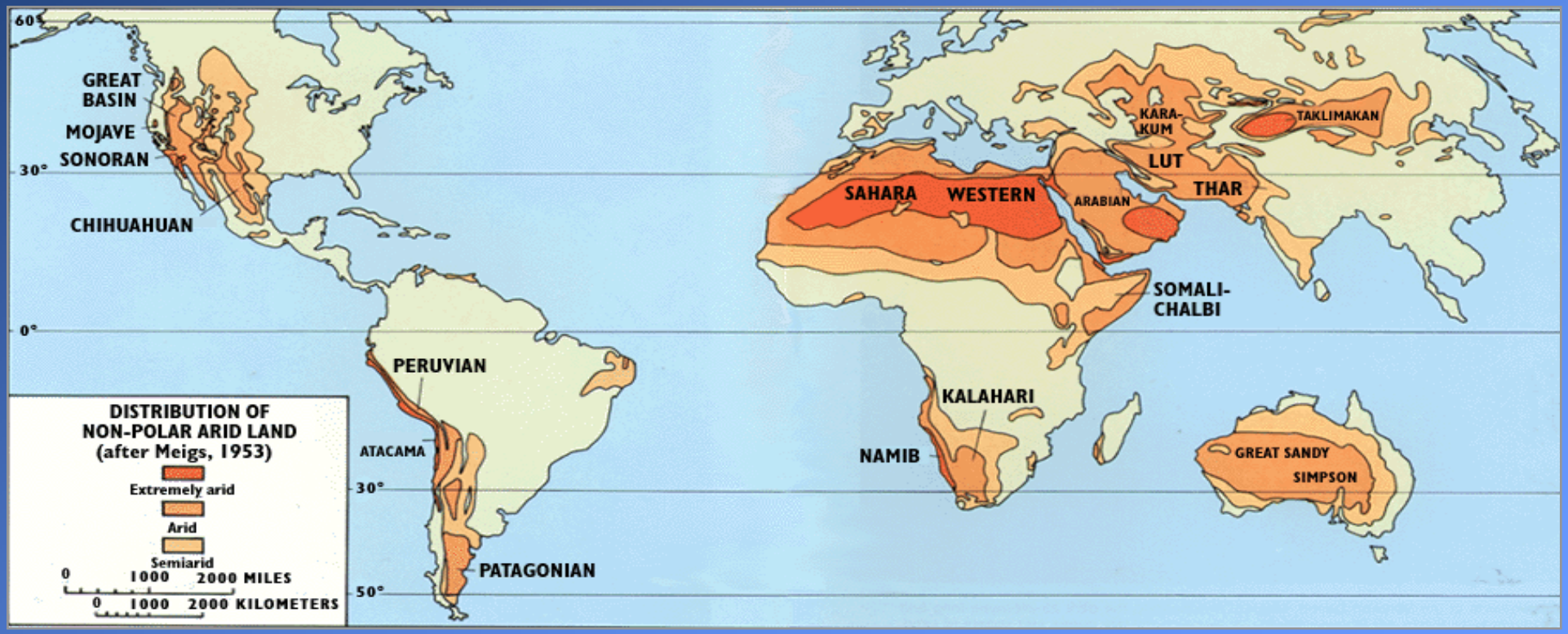
Conflict Area	Ecoregion Type	Army Land Analog
Iraq, Kuwait, Saudi Arabia	tropical/subtropical desert	Irwin, Bliss, Yuma, White Sands, Huachuca
Iran, Somalia	tropical/subtropical steppe	Hood, Sill
Korea	hot continental	Campbell, Knox, Drum, Leaonard Wood
Haiti	savanna, rain forest	None
Panama, Nicaragua	savanna, rain forest	None
Bosnia, Kosovo	Mediterranean	None
Rwanda	savanna, rain forest	None

The Pentagon's New Map





Scientific Characterization of the Army's Natural Testing Environments - Desert



Army Training & Testing Environments – Desert Southwest

- Yuma Proving Ground
- Fort Irwin
- White Sands Missile Range
- Ft. Bliss

Army Desert Environments – Scientific Characterization Study

- Expand the Army's understanding of the desert environment in order to better support the Army in meeting its world-wide mission
- The information collected is focused on identifying the militarily significant parameters that impact operations in deserts
- These parameters become the most important criteria in selecting where and how to both test the Army's equipment and conduct effective desert training

Army Desert Environments – Scientific Characterization

- Develop a **model** that characterizes deserts/arid environments by a set of scientific parameters. These environmental parameters must reflect the differences in deserts that are important to military training and operations.
- Apply the desert characterization model developed to the world's deserts, differentiating the most militarily significant sub-categories.
- Verify the desert model through a geographic analysis of Yuma Proving Ground, for military testing.
- The final task is to conduct a geographic mapping of the National Training Center at Ft Irwin based on the critical parameters identified in this work.

Conclusions

- **Current U. S. Army installation inventory provides significant training/testing lands for *Hot Continental, Sub-tropical, Temperate* and *Subarctic* environments**

- **U.S. Army installation inventory lacks coverage in the *Rainforest, Savanna* and *Mediterranean* environments - which represent 28.5 % of the world's land mass**

Conclusions

- The closure (1999) of the U.S. Army Jungle Warfare School (Panama) exacerbates the loss of critical training/testing areas in Rainforest environments
- U.S. Army forces should seek opportunities to train and test equipment in Rainforest, Savanna and Mediterranean regimes to familiarize them with the unique effects of climate and terrain in these ecosystems

Conclusions

- The U.S. Army mission is to be trained to deploy and fight worldwide within a variety of geographical settings and environments

- Army installations within the U.S. and critical forward-based training areas provide the projection platforms and training/testing environments to support this mission

- Bailey's Ecoregional Classification System provides a useful framework and organizing principle for assessing the geographical characteristics of the current U.S. Army installation inventory and for comparing these characteristics to future threat areas world wide