

Mapping a Sustainable Future in this New Era of Understanding

Brent Jones, PE, PLS

ようこそ

WELKOM

TERVETULO A

WELCOME

BIENVENIDO

VÄLKOMMEN

ยินดีต้อนรับ

SELAMAT DATANG

أهلا وسهلا

BIENVENUE

VELKOMMEN

Memorial Day



Our World Has Many New and Growing Problems

We Are Living Unsustainably . . .

. . . Out of Balance with Nature

Creating Conflicts and Instability



Human Induced Climate Changes

Pollution

Severe Droughts

Wildfires

Water Crises

Natural Disasters

Ecological Instability

Food Shortages

Pandemics

Overpopulation

Congested Cities

Steep Decline in Biodiversity

Political Polarization

Unconstrained Development

Social Conflict

Challenging Our Sustainability . . .
. . . Threatening Our Future

A Long History of Challenges

Challenges will continue....



Humans Are Problem Solvers

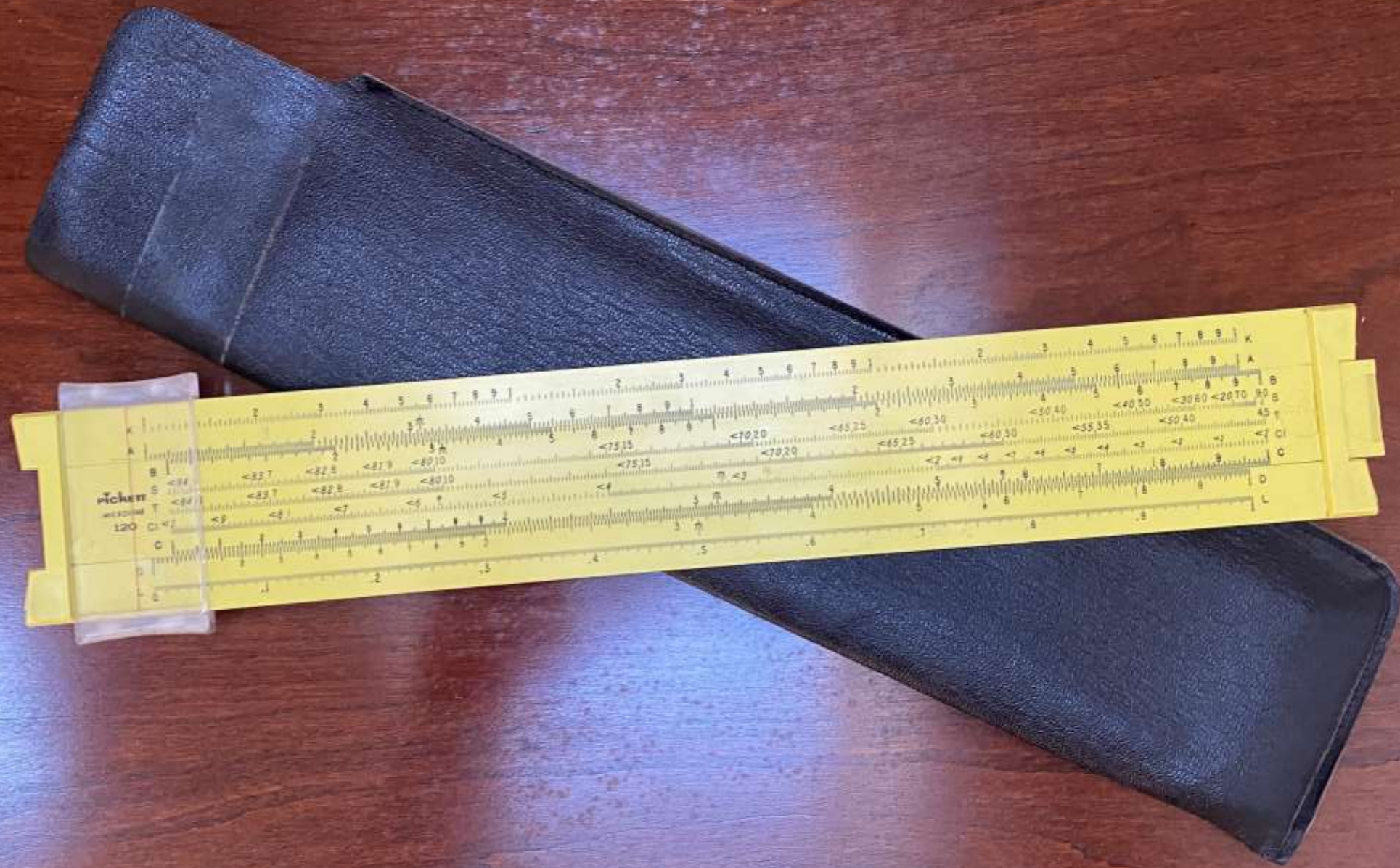
A Great History of Solving Problems....More To Do....

We unite around global challenges.....



Famine
Pollution
Cold War
Energy
Disease
....

Leveraging the Tools of the Time. . .



PICKER
120

1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10

<82.7 <82.8 <81.9 <80.10
<75.15 <70.20 <65.25 <60.30
<55.35 <50.40 <45.45 <40.50 <35.55 <30.60 <25.65 <20.70

Brent A. Jones

NOAA REPRINT

USING THE GLOBAL POSITIONING SYSTEM (GPS)
PHASE OBSERVABLE FOR RELATIVE GEODESY:
MODELING, PROCESSING, AND RESULTS

Benjamin William Remondi
National Geodetic Survey
Rockville, MD 20852

May 1984
Doctoral Dissertation
Center for Space Research
University of Texas at Austin



U.S. DEPARTMENT OF COMMERCE

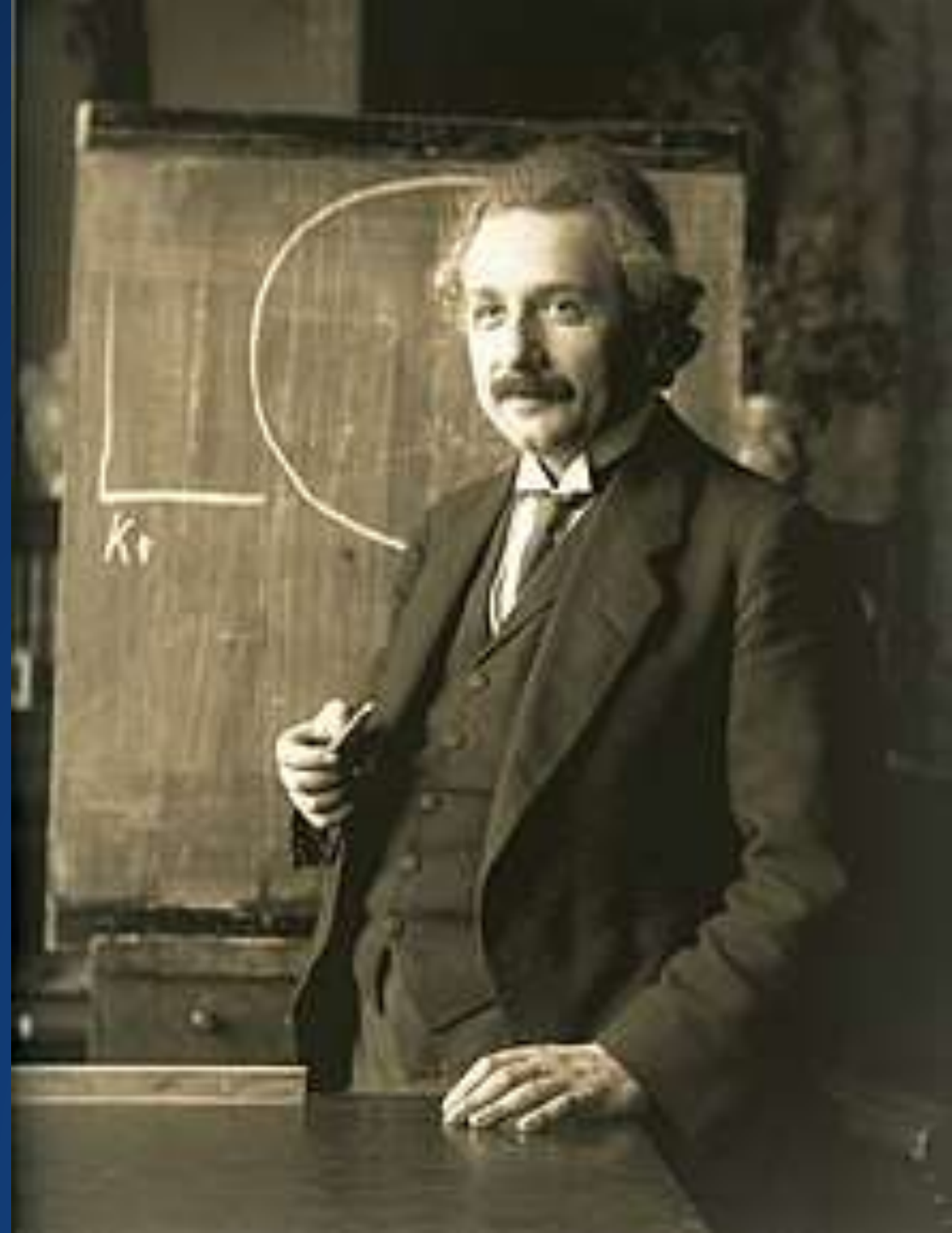
National Oceanic and Atmospheric Administration
National Ocean Service

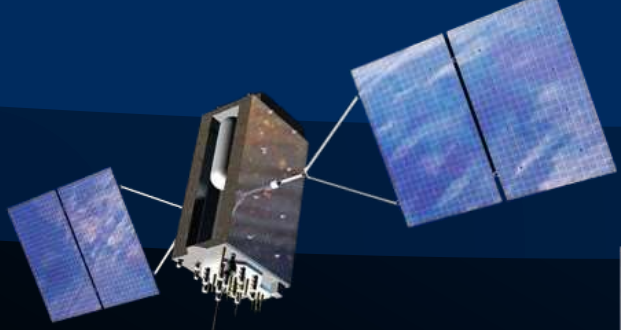
Reprinted October 1986

“We cannot solve our problems with the same thinking we used when we created them.”

- Albert Einstein

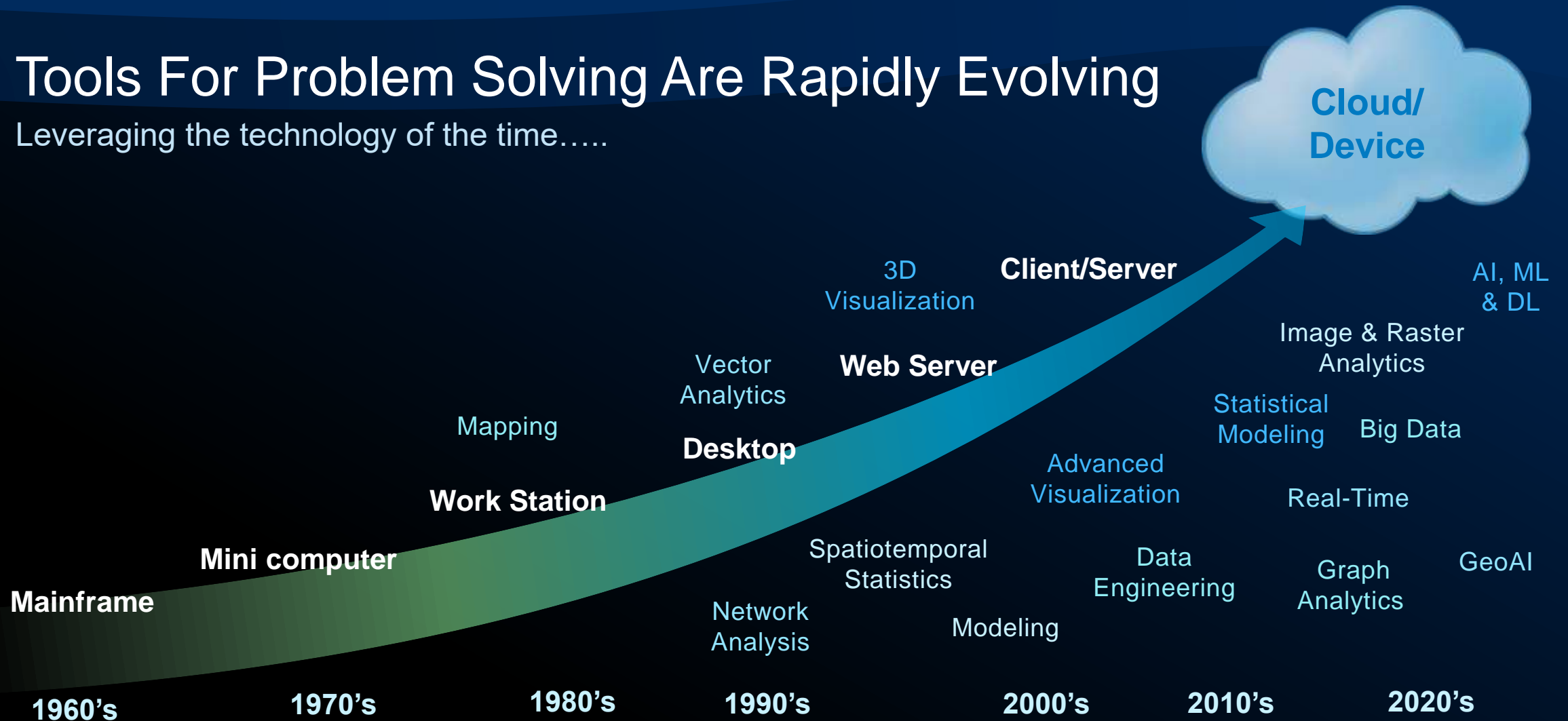
“Problem solvers are made, not born.”





Tools For Problem Solving Are Rapidly Evolving

Leveraging the technology of the time.....



Climate is the Central Problem of Our Time

Lack of *Understanding* . . .
and Failure to *Collaborate* . . .

Land Professionals Must Use the Tools of Today....

Mapping Is a Fundamental Language

Tools for Understanding and Communicating. . .

Helping Us Understand and Collaborate

Visualizing
Organizing
Abstracting
Communicating
Envisioning
Planning
Analyzing
Problem Solving
Evaluating
Acting



Mapping . . .



What Is

What Could Be

. . . Advancing Civilization

Sharing and collaborating is our responsibility . . .



Mapping Climate Risk Requires We Consider All the Factors



GIS

A New Approach.....
...to Problem Solving

Leveraging
Our Tools, Commitment
& Understanding



Measuring

Data

Assessing

Visualization &
Mapping

Predicting

Analysis &
Modeling

Understanding

Planning &
GeoDesign

Applying

Decision
Making

Action

Understanding proceeds action.....

Geospatial Technology Transforms Scientific Data

Scaling use, global sharing, easy access

Information
Understanding
Knowledge

Open Standards
and Formats

Land Cover Biodiversity

Basemaps

Habitats

Transportation Landscape

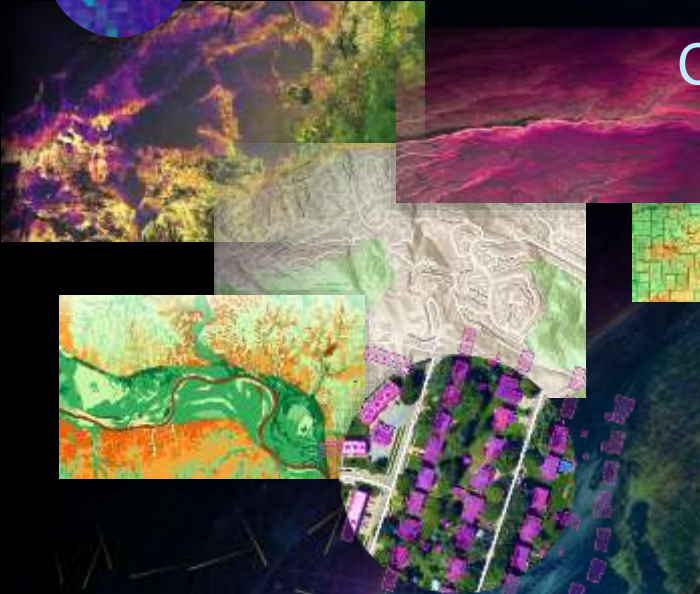
Movement Infrastructure

Environment Hydro Traffic Business

Climate Elevation Boundaries

POI Demographics Imagery

Oceans Hazards
Soils Weather



Global data sharing platform.....

GIS Innovations

Are Advancing Our Collective Ability
To Understand, Communicate and Create Solutions . . .



*Interconnecting Systems – Enabling Geospatial Infrastructure
Opening Up and Extending the Application of GIS*

GIS Delivers Understanding to Climate Challenges

Applying The Geographic Approach

Creating Solutions for a More Sustainable Future



However,
We Need to Scale Up Our Collective Efforts . . . Exponentially

Managing and Applying Land Information

Parcel Land Use



MipMap
AIUla, Saudi Arabia

Mapping Boundaries
of Agricultural Co-ops



Eos Positioning
Systems
Fond-des-Blancs, Haiti



Land Acquisition
Management for Pipeline



Dawood Engineering
Illinois

Acquisition Portal



Deed Transaction Dashboard



County Assessor
Oklahoma County, Oklahoma

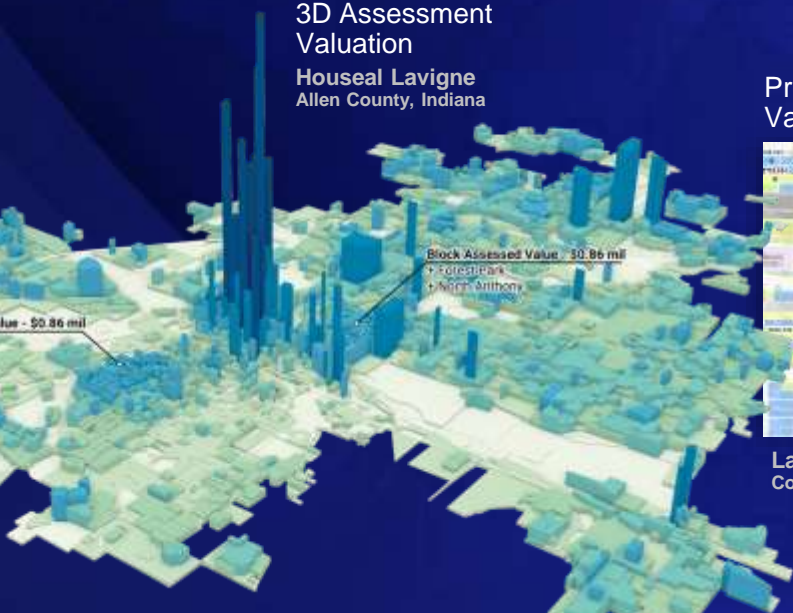
3D Property Zoning



GDS Latam Group
City of Buenos Aires, Argentina

3D Assessment
Valuation

Houseal Lavigne
Allen County, Indiana



Property
Valuation



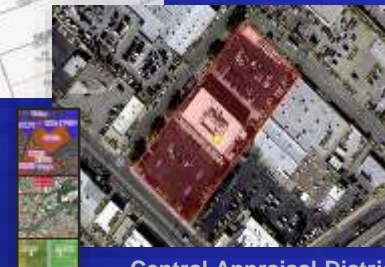
Larimer County
Colorado

Parcel Fabric Tax Map



County of Whiteside
Sterling, Illinois

Land Parcel
Reporting



Central Appraisal District
El Paso, Texas

Parcel Visualization



Majlis Bandaraya
Johor Bahru, Malaysia

Smart City
GIS Dashboard



Vexiza
Guadalajara, Spain

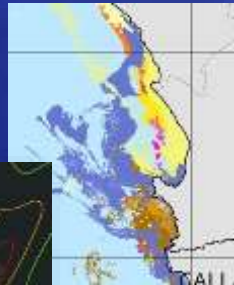
Environmental Assessment and Conservation

Climate Change Sea Level Rise



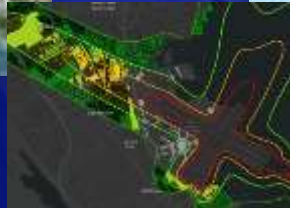
Samish Indian Nation
Department of Natural Resources
Washington

Oil Spill Damage & Restoration



CONIDA
Lima Shoreline

Noise Impacts



San Francisco Int'l Airport
San Francisco Bay, California

Freshwater Fish Diversity



Field Museum of Natural History
Guyana

Sea Turtle Patrol



Amber Kuehn
Hilton Head Island,
South Carolina

Typhoon Monitoring



NIED
Tsukuba, Ibaraki, Japan

Real-Time Weather Dashboard



Australia

Extreme Heat Map



Metropolitan Council
Twin Cities, Minnesota

Monitoring Tarangire Ecosystem



National Conservation Planning



TNC Mongolia
Mongolia

Techno-Environment Investment Tanzania



USGS

Conservation & Stewardship Atlas
America the Beautiful (30 x 30)

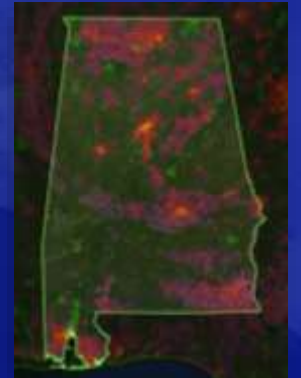


Real-Time Flood Inundation Mapping



NOAA | NWC
US

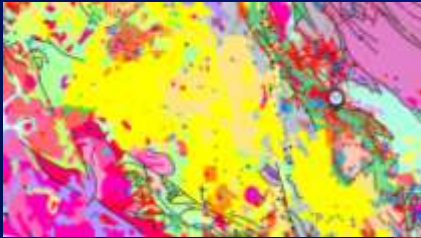
Modeling Biodiversity



E.O. Wilson Biodiversity Foundation
Alabama

Natural Resources Management

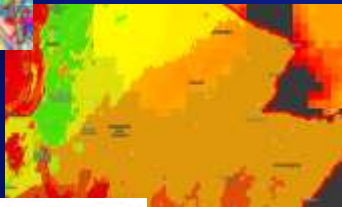
Mineral Exploration



GeoMarvel
British Columbia, Canada

Minerals

Geothermal
Suitability

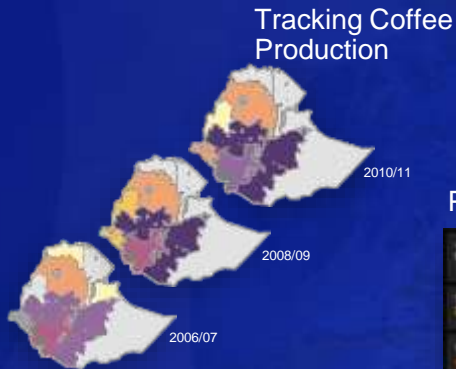


Getech Group
South America

Subsurface Oil
& Gas Storage



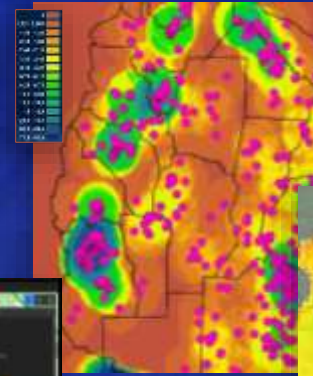
Research Center of Post-Mining
Western Westphalia



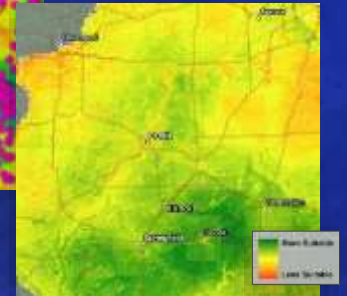
Central Statistical Agency
Ethiopia

Agriculture

Organic Agriculture



Suitability for
Lease Farm
Agriculture



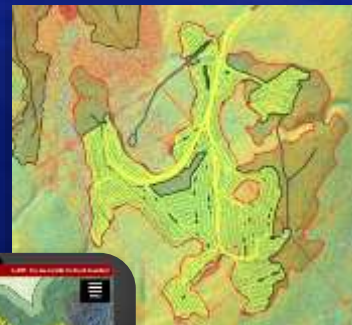
AgReserves
Illinois

Palm Oil Production



Sime Darby
Malaysia

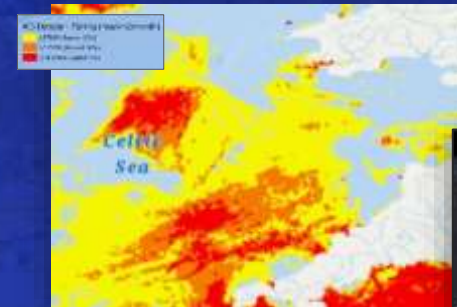
Timber Management
Planning



Lim Geomatics
Alberta, Canada

Fisheries

Tracking Commercial Fishing



University College Cork
Ireland | Western UK

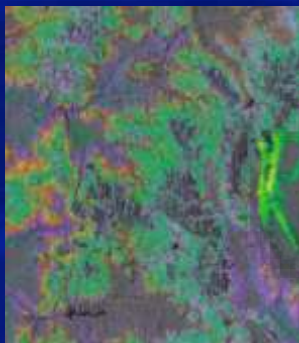
Illegal Fishing



Quiet Professionals
South America

Forestry

Modeling Forest
Carbon Pools



USDA Forest Service
Colorado

Forest Carbon
Modeling



US

Tracking
Timber
Harvests



Ontario, Canada

Urban and Regional Planning

Tracking Urban Development



GloboLive3D
Hong Kong

Evaluating Urban Growth Scenarios



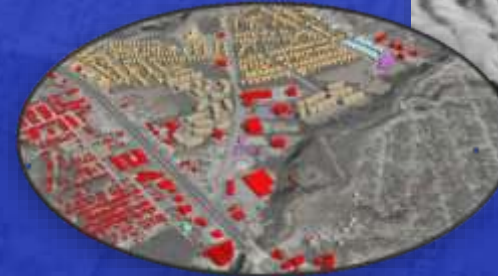
Monash University
Melbourne, Australia

Master Plan



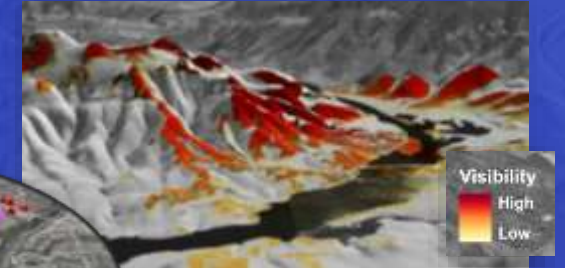
University of Baghdad
Fallujah, Iraq

Zoning Administration



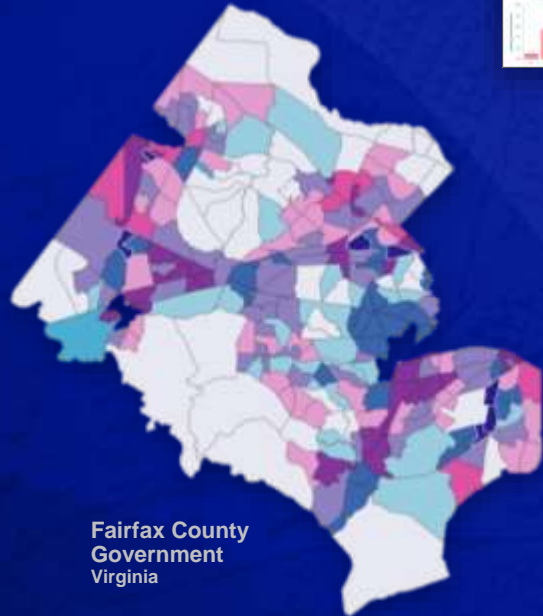
Columbus Consolidated Government
Columbus, Georgia

Visual Impact of Proposed Bridge



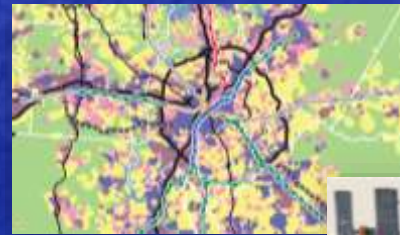
Entura
Hobart, Tasmania, Australia

Tree Planting Suitability



Fairfax County Government
Virginia

Land Use & Transit Planning



Columbia
South Carolina

Land Use Plan



Brihanmumbai Municipal Corporation
Mumbai, India



Regional Planning
Institute of Geography of ANAS
Azerbaijan

Green Infrastructure



Region Skåne
Sweden

Analyzing Housing Permits



City of Houston
Texas

Planning for and Responding to Disasters

Hurricane Tracking & Assessment



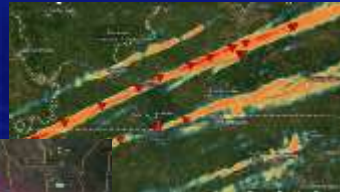
Bent Ear Solutions
Southeastern US

Volcanic Eruption



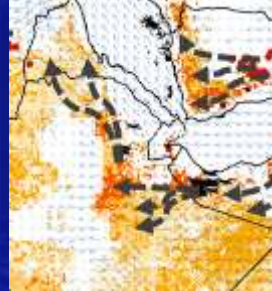
takatoa
La Palma, Spain

Real-Time Tornado Analysis



DTN
Kentucky | Missouri |
Arkansas | Tennessee

Desert Locust Movement Prediction



IGAD
Eastern Africa

Flood Modeling



Ministerio Medio Ambiente
San Salvador, El Salvador

Flood Dashboard



eThekweni Municipality
Durban, South Africa

Flood Simulation



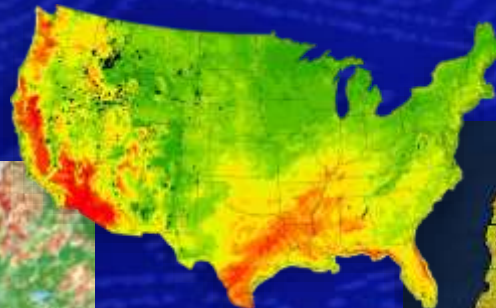
Ministry of Land, Infrastructure,
Transport and Tourism
Arakawa River, Japan

Structure Collapse



FEMA
Surfside, Florida

Drought & Wildfires



Argonne National
Laboratory | US DOE
US

Wildfire Risk



Pamukkale University
Mount Ida, Turkey

Fire Forecast



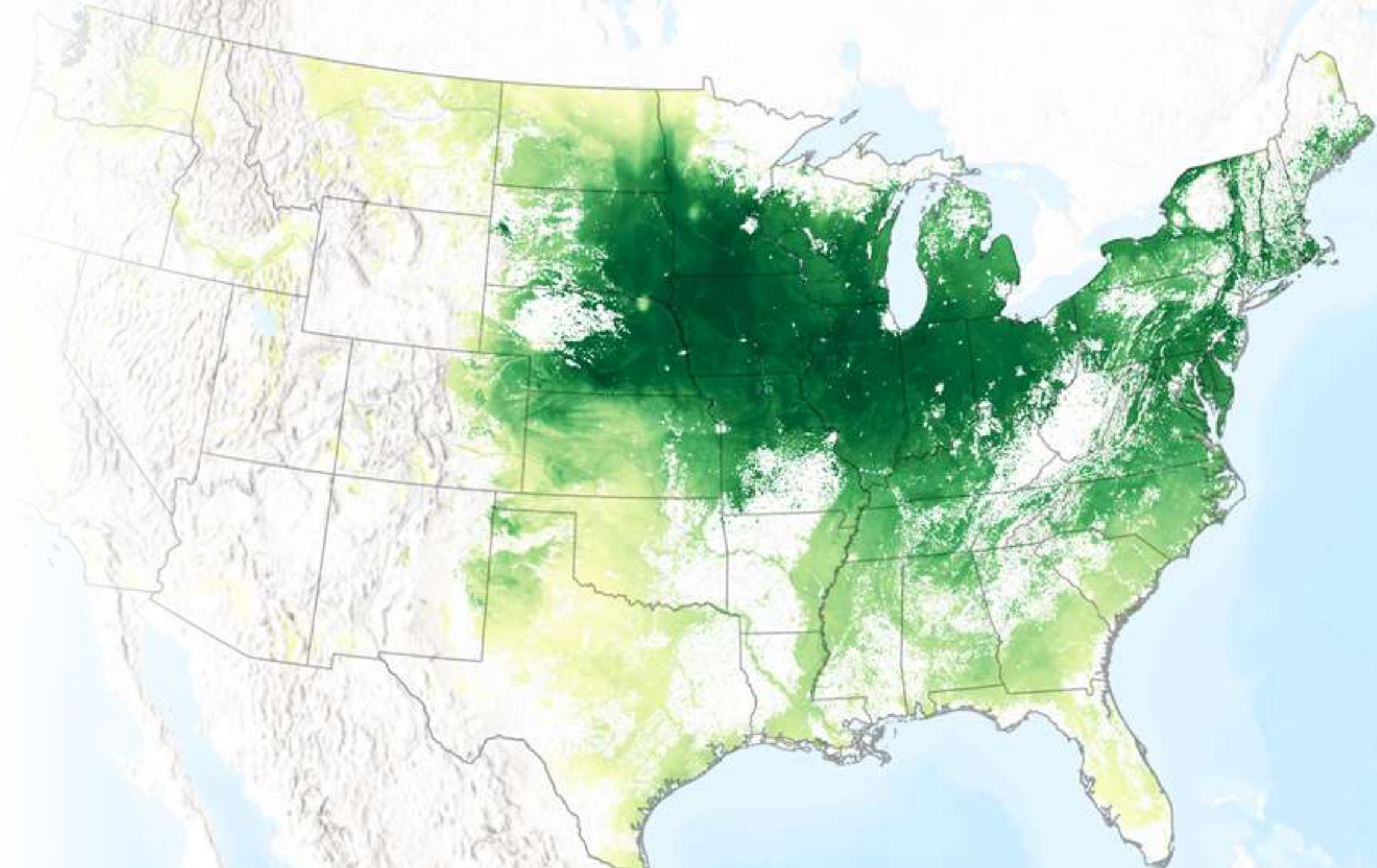
Red Cross
Lebanon

Sea Level Rise

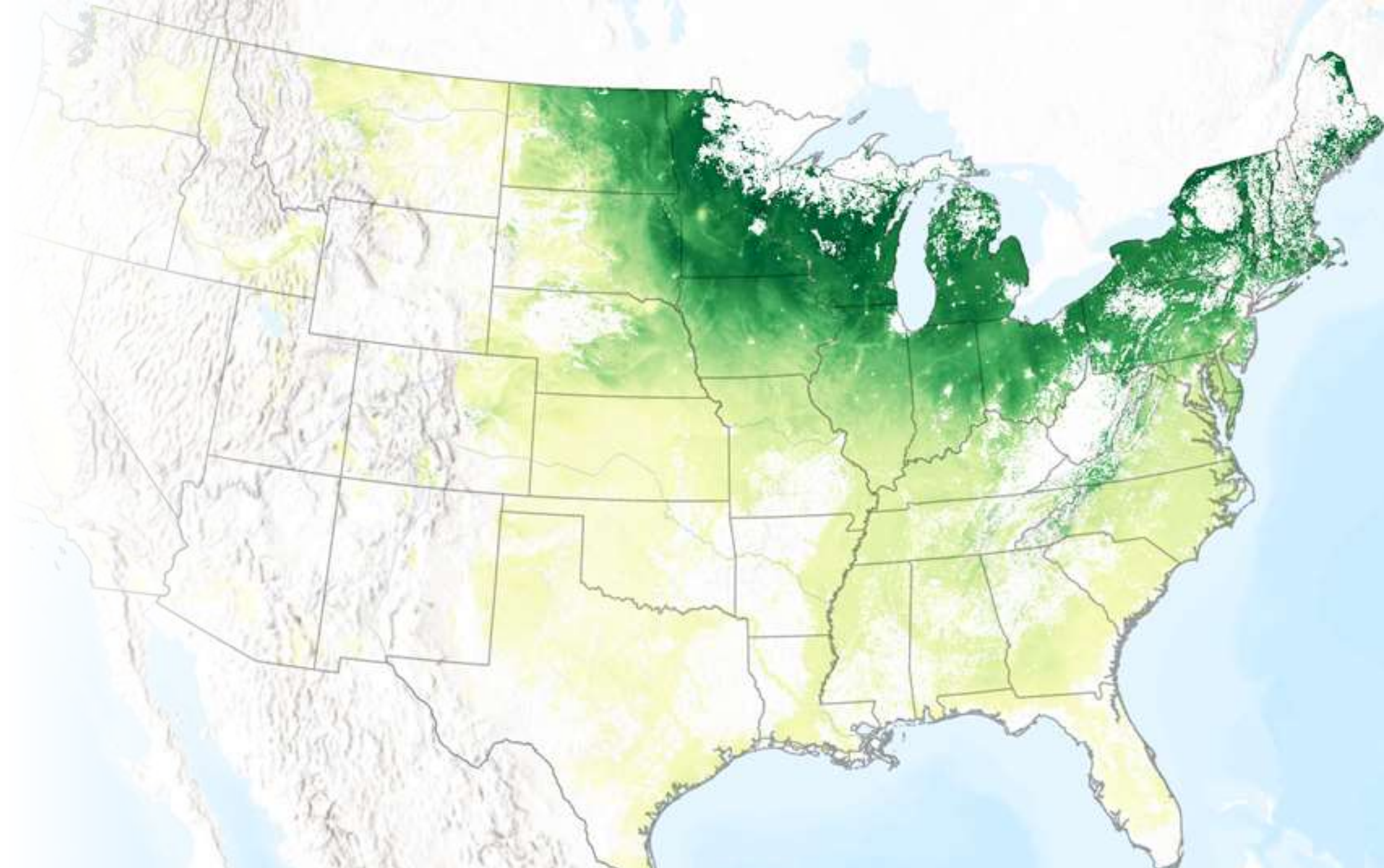


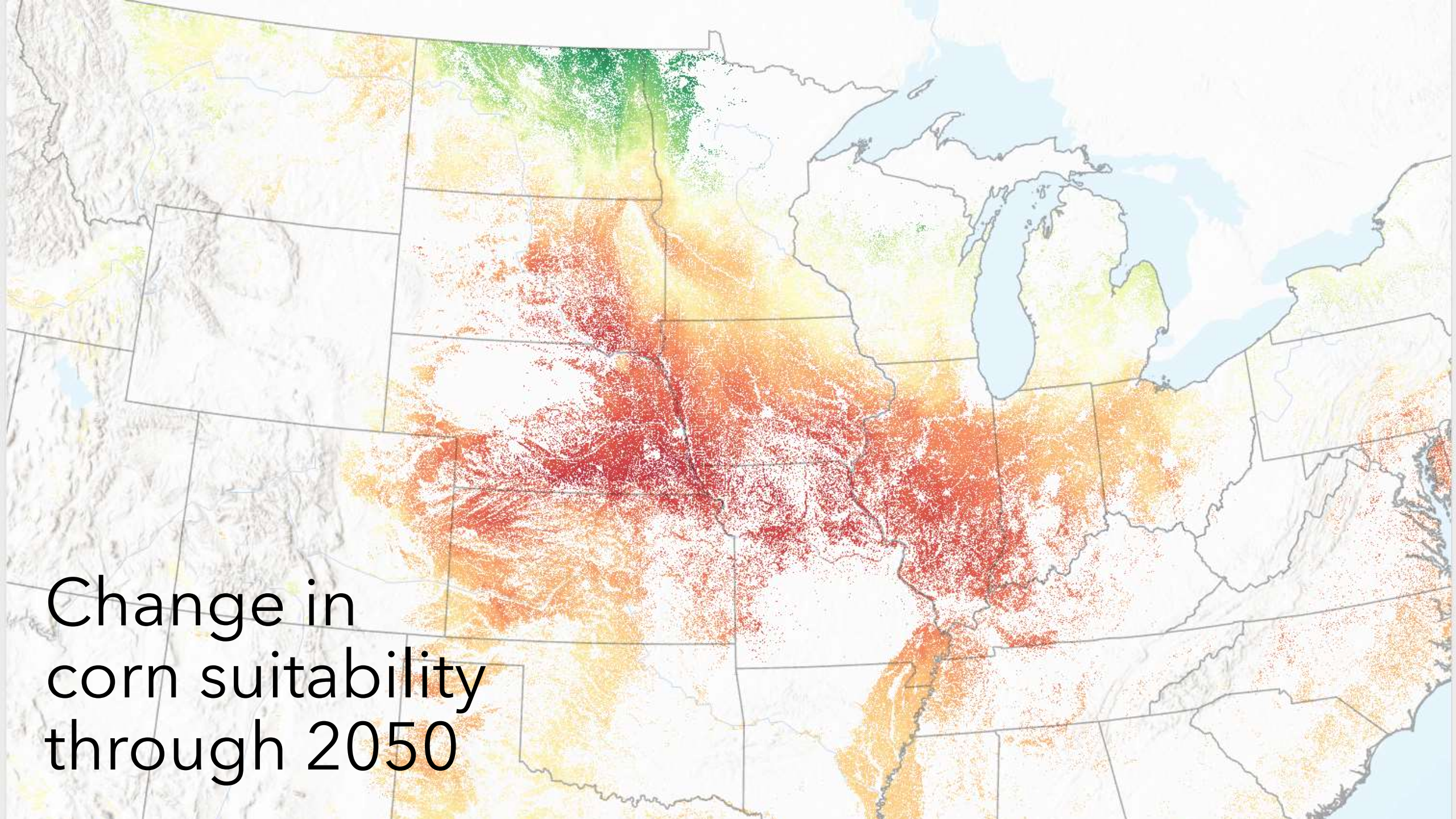
North Point Geographic Solutions
Texas | Louisiana | Mississippi

Current results (baseline)



Future results (2050 SSP2-4.5)





Change in
corn suitability
through 2050

Yield forecasts

Pop-up

Change in corn production - Custer County

Even with significant emissions reductions, Custer County, Nebraska could experience a change in corn production of

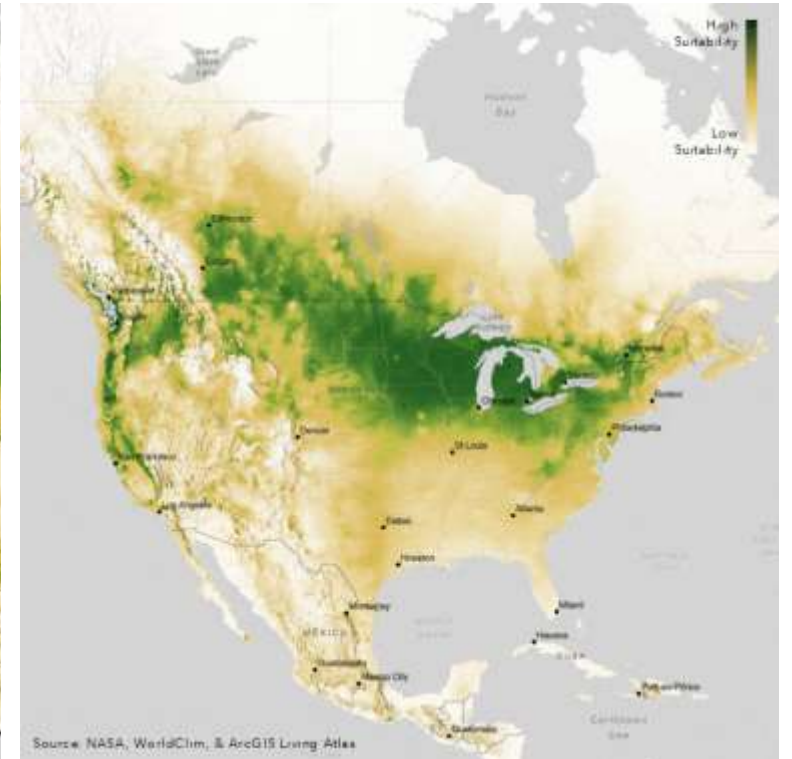
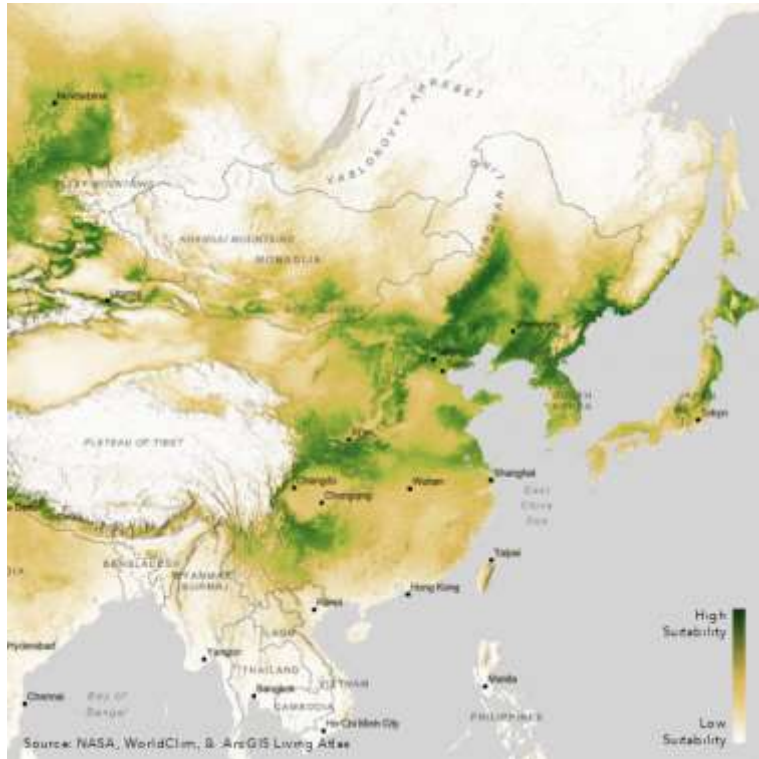
-18.3 million bushels

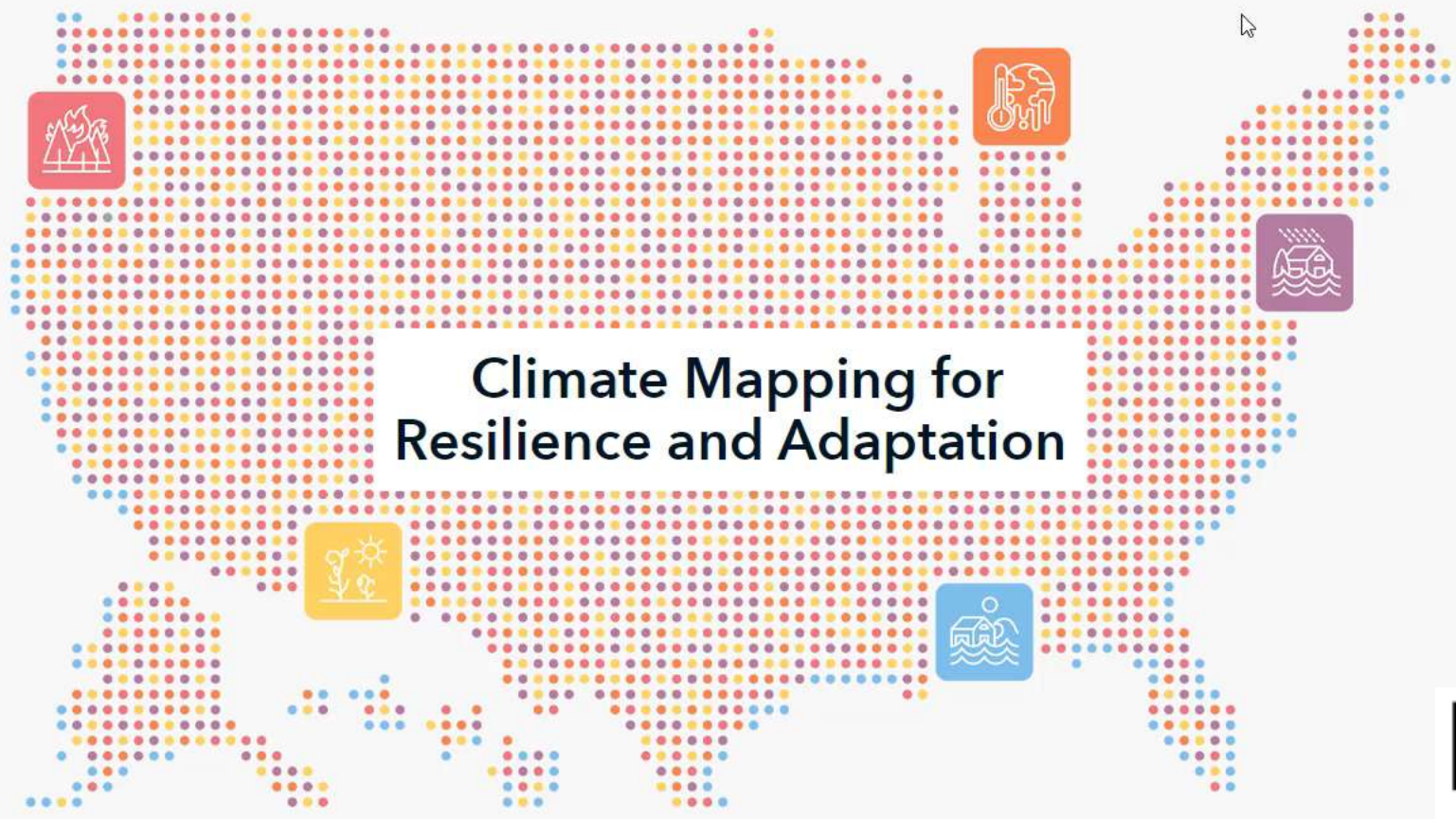
a **-60.9%** difference compared to current production

◀ 1 of 1 ▶ 99.7223307°W 41.3918624°N



Replicating elsewhere





Climate Mapping for Resilience and Adaptation

Climate Mapping for Resilience and Adaptation (CMRA) integrates information from across the federal government to help people consider their local exposure to climate-related hazards. People working in community organizations or for local, Tribal, state, or Federal governments can use the site to help them develop equitable climate resilience plans to protect people, property, and infrastructure. The site also points users to Federal grant funds for climate resilience projects, including those available through the Bipartisan Infrastructure Law.



Climate-related hazards in real-time

Land Professionals

Have a Special Responsibility

Call to Action

These problems won't solve themselves

We need to think and act differently

We need to lead this paradigm shift

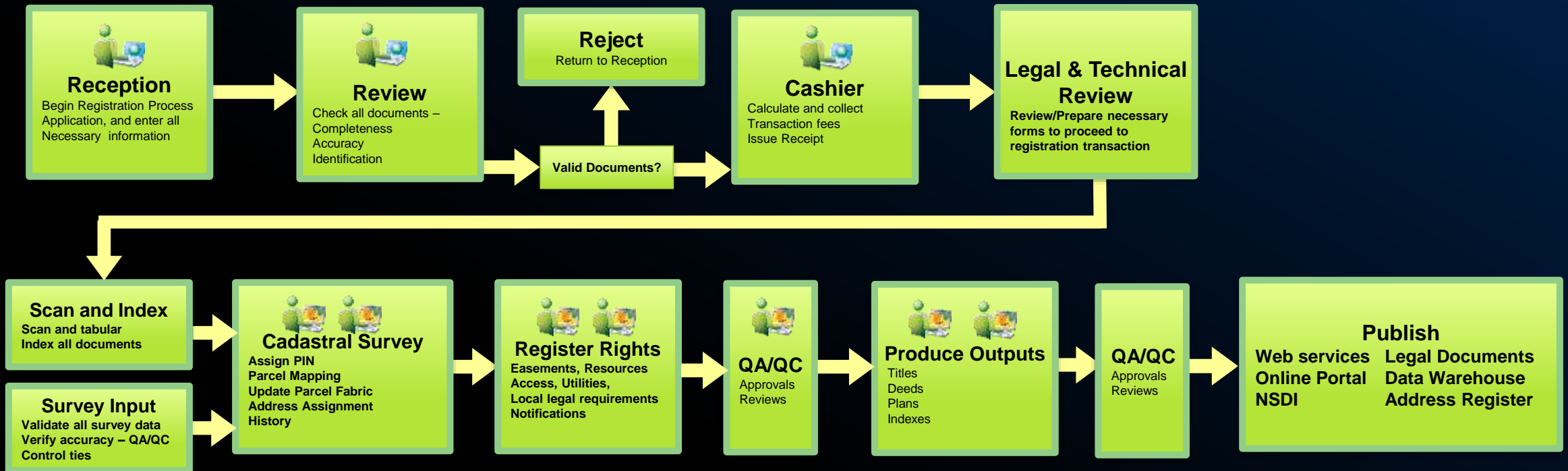
We are problem solvers

We need to do the work

Collective understanding leads to global action....

Streamline and Automate Outdated Processes

- We lack capacity and human resources – automate and modernize
- Leverage our human resources in a more productive and responsible way



Modernize

- Modernize to take advantage of the tools of today to solve today's problems
- Leave your organization as modern as possible so they don't start from the beginning
- Modernization makes you more resilient



Build an Evolvable Organization

- To take advantage of the tools that are coming tomorrow
- Solve the problems of tomorrow
- Use growing technology
- Configure, don't build
- We don't have time



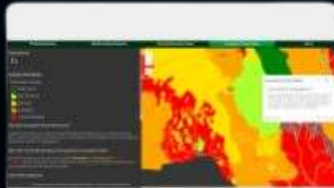
Configure a Data Sharing Portal

- Scientists, society, engineers, everyone needs your data
- Become a reliable data supplier – your value will increase



My lens: South Africa's Marine Spatial Planning..

Marine Spatial Planning, a 'multi-tool' in the conservation toolbox



Status of Protected Areas in Malawi



Battling Land Degradation in Lesotho

GIS supporting the fight against soil erosion



Wetlands are disappearing three times...

Conservation vis-a-vis economic development; the Yala swamp puzzle



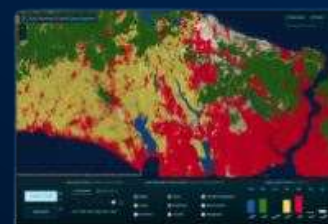
Building Resilient and Sustainable Informal...

This collection provides an overview of MapRI's use of GIS to support in Building...



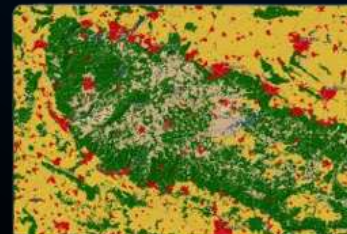
Digital Earth Africa's Sentinel-2 Annual...

Digital Earth Africa (DE Africa) Sentinel-2 GeoMAD (Geomedian and Median...



Sentinel-2 Land Cover Explorer

Annual 10-meter global land use/land cover maps presented in a ready to use web applicati...



Sentinel-2 10-Meter Land Use/Land Cover

Exploring change in the new 2017-2021 time-series



World Imagery Wayback



EcoExplorer

Explore the terrestrial ecosystem through the World Ecophysiology Map.

Land Professionals

Have a Special Responsibility

We can do this
We're problem solvers





Thanks.