2018 Spring Preview

DEVELOP National Program

Urban Development

Health & Air Quality

Water Resources

Agriculture & Food Security

Ecological Forecasting

Disasters

1st TERM (19)

2nd TERM (2)

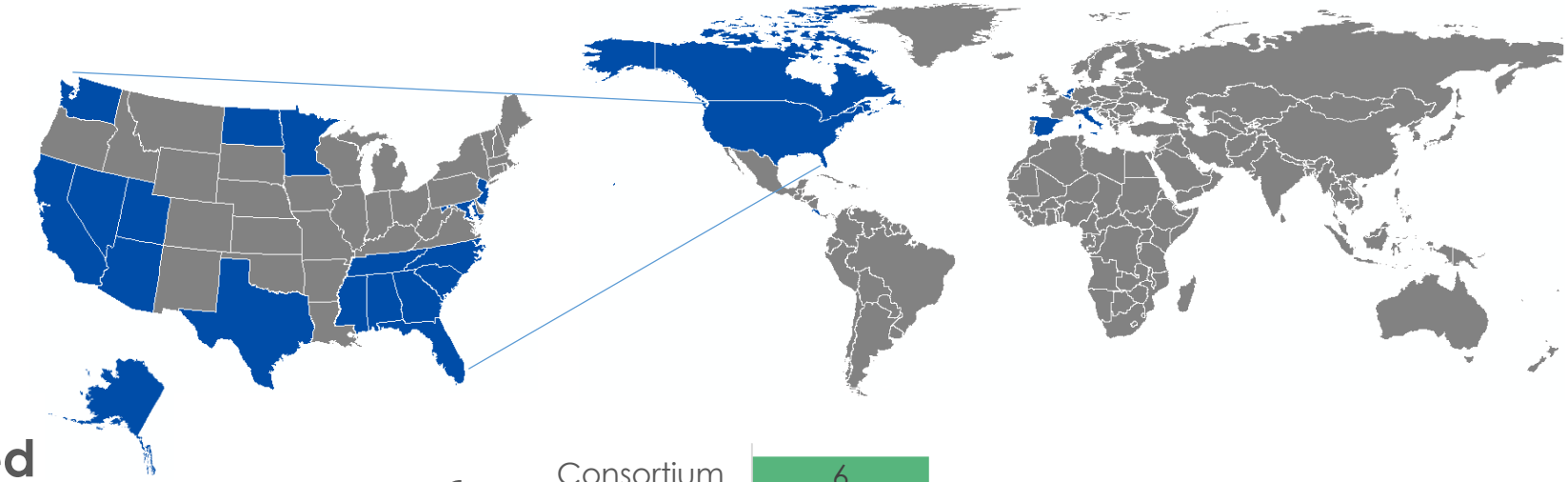
3rd TERM (0)

2018 Spring Portfolio

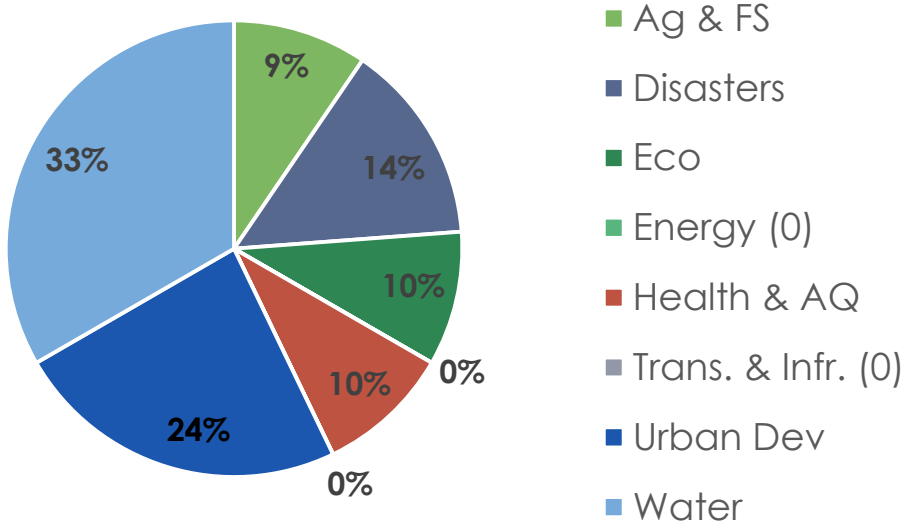
21 Projects

81% Domestic
19% International

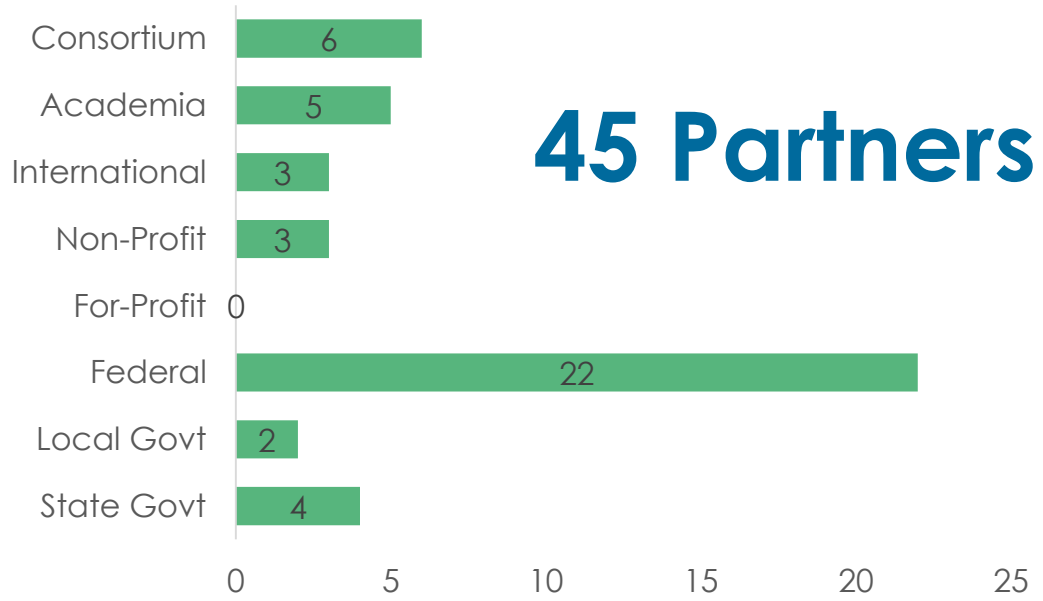
18 States & 7 Countries Impacted



Application Areas Addressed



Partner Total by Type



45 Partners

*Impacts and partners are not final

Ajax Urban Development

Arizona - Tempe

Community Concern: Recent extreme weather events have impacted forest health and led to a reduction of Ajax's urban forest coverage. Future climate projections indicate an increase in climatic stressors on the urban forests. Urban greening, including increasing tree canopy coverage are effective infrastructural adaptations to the health impacts of heat.

Partners:

- Town of Ajax, Operations & Environmental Services
- Great Lakes and St. Lawrence Cities Initiative
- Arizona State University, Urban Climate Research Center

Earth Observations:

- Landsat 8 OLI
- Landsat 5 TIRS
- Sentinel-2 MSI

Impact & Benefit: Inform Ajax's Climate Adaptation Plan by identifying areas to invest in urban forestry coverage to reduce the impact of extreme heat on vulnerable residents. This would allow for municipal foresters, policy planners, and utility operators to prioritize best management practices to maintain a resilient socioecological system.

Black Rock Playa Urban Development

California – JPL

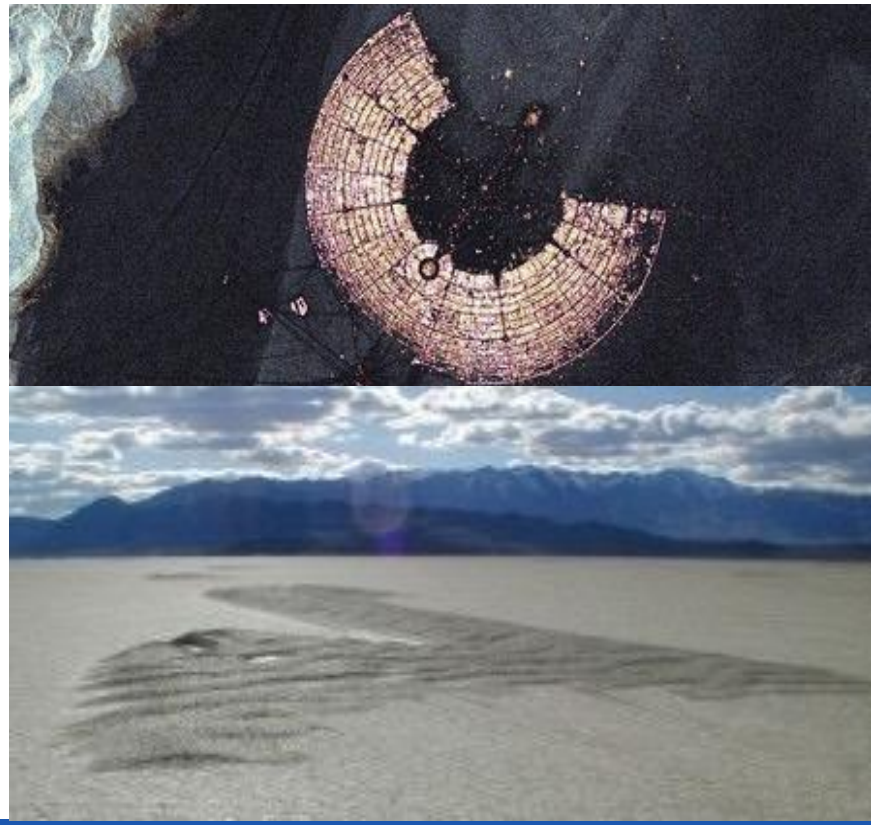
Community Concern: The Black Rock Playa has seen the unnatural formation of dunes and pits over the last decade. Debate exists amongst the public as to the cause. There are air quality concerns since there are fine dust particles in association with the dunes. The Burning Man event is requesting permission to raise the population at the festival in the Playa to 100,000 people, but there is a concern that a larger population will cause more landscape changes and reduce air quality.

Partners:

- Bureau of Land Management, Winnemucca District, Black Rock Field Office

Earth Observations:

- ALOS-PALSAR
- ERS-2
- RADARSAT-1
- JERS-1
- Sentinel-1 C-SAR
- Sentinel-2 MSI
- Landsat 5 TM, Landsat 8 OLI
- Terra ASTER



Impact & Benefit: The end products will provide additional insight to partners in determining the source of the dunes. The end products will be an additional resource that BLM will use to determine if a population increase in the area can be permitted and the results will be included in their National Environmental Policy documents to decide whether recreational events, such as Burning Man, should be permitted in the area.

Miami Beach Urban Development II

Georgia – Athens

Community Concern: The cities surrounding Biscayne Bay have increased their storm water drainage capacity and pump stations as their primary adaptive strategy to mitigate effects associated with changing coastal conditions. These predicted changes in shoreline could significantly impact the economies (primarily the tourist industry) of The City of Miami Beach and others in Biscayne Bay. Additionally, declining water quality and hurricanes pose major threats to coastal communities surrounding this area.

Partners:

- City of Miami Beach, Public Works Department

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- Terra MODIS
- Terra ASTER

Impact & Benefit: Project end products will contribute to resiliency studies being conducted by officials at the Miami Beach Public Works Department. The outputs of this project will enhance ongoing storm surge modeling research for Miami Beach and its neighboring cities. Decisions about prioritizing certain areas of interest in relation to sea level rise and coastal resiliency will be enhanced by the methods and results produced throughout this project.

New Jersey Urban Development

Alabama – Marshall

Community Concern: Over recent years in New Jersey, more citizens are relocating to areas near forests known as the wildland-urban interface (WUI). The increase in WUI requires developers to build neighborhoods adjacent to natural areas, resulting in forests becoming less healthy and more damage from accidental forest fires.

Earth Observations:

- Landsat 8 OLI
- SMAP
- GPM GMI

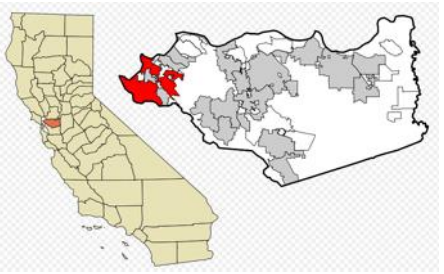
Partners:

- New Jersey Pinelands Commission

Impact & Benefit: There are a number of variables that influence a community's vulnerability to wildfire damage, and a better understanding of these variables will help decision makers determine areas to consider for fuel reduction treatments and areas that have the lowest risk of wildfire and are most suitable for development.

Richmond Urban Development

California – ARC



Community Concern:

- **Sits within a ring** of five major oil refineries, three chemical companies, two rail yards, highways, and is a port for tankers
- Roughly **20% of young people** (1 - 17) were diagnosed with asthma between 2009 and 2012
- Under-treed neighborhoods **don't want to plant trees** because of the effort and cost involved in planting, maintaining, and caring for the tree.

Earth Observations:

- Landsat 8 TIRS, OLI
- Landsat 5 TM
- Sentinel-2 MSI

Partners:

- Groundwork USA, Groundwork Richmond

Impact & Benefit:

- Introduce GR to the capabilities of NASA EO and how they can be used to **track the progress** of their urban greening initiatives
- **Identify areas** that are lacking in green infrastructure
- Provide additional **education materials** that will help the partners when talking with the public about the benefits of trees
- Introduce the young leaders who work with Groundwork to **other STEM opportunities** within the environmental field

Photo: John Storey, Special To The Chronicle

California Health & Air Quality

California – ARC

Community Concern:

- The findings provided by the World Health Organization from 2013 ranked **air pollution as the 4th highest risk** factor for death globally
- As of 2016, there are **39.35 million people living in California**, all of whom are affected by air quality
- Poor air quality can **diminish an individual's quality of life** and result in diseases such as asthma, respiratory illnesses, and heart-related complications

Partners:

- California Air Resources Board
- UCLA Institute of Transportation Studies
- NASA Earth Exchange

Earth Observations:

- CALIPSO CALIOP
- Terra MODIS

Impact & Benefit:

- Introduce partners to **VOCAL** and improve use of CALIPSO data
- **Understand influences** of climate related policy initiatives by measuring AOD and P.M 2.5 at different intervals around CA air quality legislation dates
- Provide **geographic concentration visualizations** of where aerosols are concentrated over time and how they change by season and year.

Western Europe Health & Quality II

Maryland - Goddard

Community Concern: Over one million people worldwide die from mosquito-borne illnesses every year. An understanding of the environmental conditions that promote mosquito breeding is essential in fighting mosquito-borne diseases like malaria, Zika, and West Nile Virus. Many organizations collect data on these conditions, but there is a lack of international collaboration connecting the datasets.

Partners:

- Global Mosquito Alert Consortium
- The Woodrow Wilson International Center for Scholars
- Citizen Science Association
- European Citizen Science Association
- Institute for Global Environmental Strategies
- Wageningen University
- Sapienza Università Di Roma

Earth Observations:

- Terra MODIS
- Aqua MODIS
- GPM IMERG
- SRTM SAR
- Aqua AIRS

Impact & Benefit: In addition to providing a proof of concept on applying integrated citizen science data with EO, a near real-time Google Earth Engine interactive vector-borne risk map will help organizations in their decision-making processes with respect to mosquito vector control and disease risk abatement.

Fremont Water Resources

Virginia - Wise

Community Concern: Despite several years of higher than average snowpack in the Dirty Devil River watershed, reductions in irrigation water from the Fremont River are being requested. The requests have become more common in recent years even though the acreage under irrigation has remained reasonably static. Capitol Reef National Park manages historic orchards and pastures that rely on irrigation water from the Fremont River, part of the Dirty Devil basin. Currently, the National Resources Conservation Service creates forecasts for the Dirty Devil River downstream of Capitol Reef, but it does not partition out flows for the Fremont River.

Partners:

- National Park Service, Northern Colorado Plateau Network
- National Park Service, Capitol Reef National Park

Earth Observations:

- SRTM
- Landsat 5 TM, Landsat 7 ETM+, Landsat 8 OLI
- Terra Modis
- SMAP

Impact & Benefit: A down-scaled river forecasting model for the Fremont River at the USGS gauge at Bicknell and a time series of snow extent in the Fremont River watershed upstream of the gauge will improve current methods of predicting water resources throughout the Dirty Devil River Watershed. Better planning for irrigation water use and better anticipation of calls for voluntary reductions in irrigation are a few of the decision making processes which will be impacted with the incorporation of NASA Earth observations.

Image Credit: Jeff Hollett

Mojave Desert Water Resources

Virginia - Wise

Community Concern: Bighorn sheep populations in California and Nevada are affected by a combination of available resources, predation, and disease. The compounding effects of these impacts can make monitoring and managing BHS populations complex. As these species play a key ecological and economical role in the mountainous regions of the Mojave Desert, in-depth studies and inter-agency collaborations are essential for managing the species. For more effective widespread planning and management decisions to be made, it is important to have a more synoptic, holistic view of resource availability across the region in regard to BHS habitat selection.

Partners:

- NPS, Mojave National Preserve
- NPS, Biological Resources division, Wildlife Health Branch
- California Dept of Fish and Wildlife, wildlife Branch, Game Management
- Oregon State University, Dept of Fisheries & Wildlife
- Sierra Nevada Bighorn Sheep Foundation

Earth Observations:

- Landsat 5 TM & Landsat 8 OLI
- Terra & Aqua MODIS
- SMAP

Impact & Benefit: The trend analyses and maps produced by this project will support the management of BHS and their habitat by providing additional datasets to inform resource availability, disease mitigation, and plans for managing habitat connectivity in the Mojave Desert region. This research will complement other studies on nutrient availability and population dynamics that are being conducted by collaborating organizations, and would allow for better resource planning and efficiency among management staff through a more improved understanding of the BHS habitat dynamics of the region. Ultimately, all of this information will be combined into models to describe habitat selection and utilization.

Image Credit: Ann Schonlau NPS

Navajo National Monument Water Resources

Idaho - Pocatello

Community Concern:

- Navajo National Monument houses three of the best-preserved 13th century cliff dwellings in the southwestern United States.
- Monsoonal storms and flash floods in the region combined with the prevalence of drier annual conditions has exacerbated erosional processes affecting these historic dwellings.

Partners:

- National Park Service, Navajo National Monument
- Colorado State University

Earth Observations:

- GPM GMI
- SRTM
- Terra & Aqua MODIS
- SMAP
- TRMM PR
- TRMM TMI

Impact & Benefit:

- Provide precipitation monitoring for remote-location
- Provide information about broad-scale erosional processes

Osa Peninsula Water Resources

Georgia – Athens

Community Concern: Although Costa Rica is considered a pioneer for conservation, the country relies on extensive use of pesticides and fertilizers. The abounding rivers of Osa Peninsula, Costa Rica are threatened with contamination due to monoculture, animal agriculture, and human settlement, impacting Osa's extremely biodiverse and vulnerable flora and fauna.

Partners:

- Osa Conservation

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- Terra ASTER
- Sentinel-2 MSI

Impact & Benefit: This project will help partners assess threats to river water quality and mangrove health based on watershed and riparian land use in the Osa region. End products will be used by Osa Conservation and distributed to the National System of Conservation Areas (SINAC), Ministry of Environment and Energy (MINAE), and local communities to inform watershed restoration, legislation, monitoring, and education.

Plum Island Water Resources

Massachusetts - Boston

Community Concern: USFWS Region 5 Refuges manage ~24k ha of coastal wetlands that are being impacted by sea-level rise and climatic forcing. Hundreds of millions of dollars have been invested into restoration projects to enhance coastal resiliency in response to marsh destabilization.

Partners:

- USGS, Woods Hole Coastal and Marine Science Center
- USFWS, Parker River National Wildlife Refuge
- Long Term Ecological Research Network, Plum Island Ecosystem LTER

Earth Observations:

- Landsat 8 OLI
- Sentinel-2 MSI

Impact & Benefit: EO of model outputs will facilitate the estimation of surface sediment distribution and sediment flux in and out of the inlet. Results will allow the end user to better quantify sediment budgets for the Plum Island Estuary and help guide preservation and restoration practices.

Puget Sound Water Resources

Alabama – Marshall

Community Concern: In the Puget Sound, dissolved oxygen levels have been in decline since 2000 due to eutrophication. Resulting hypoxic waters reduce populations of sessile organisms and fish, both important to Washington's economy.

Partners:

- Pacific States Marine Fisheries Commission, Habitat Program

Earth Observations:

- Landsat 8 OLI
- Terra MODIS
- Aqua MODIS
- Sentinel-2 MSI

Impact & Benefit: This project will assess the suitability of remote sensing to fill geographic and temporal gaps in data available to the PSMFC Habitat Program. Adding remote sensing techniques to the Habitat Program's data acquisition methods will save time and money while further informing decision-making practices and fisheries management.

Utah Water Resources

Colorado – Fort Collins

Community Concern: The USGS and BLM currently manage free-roaming wild horses and burros on public lands with the aim to support healthy populations on rangelands as part of its multiple-use mission. There is limited information regarding water resources for equids in semiarid ecosystems. Enacting informed and effective management decisions by the USGS and BLM has been challenging from this paucity of information regarding water resources.

Partners:

- USGS, Fort Collins Science Center
- BLM, Utah State Office

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- SRTM

Impact & Benefit: This project will save the USGS and BLM time and money by further refining monitoring and field survey efforts. The project also enables analysis across larger scales and new study sites that would not be possible without full utilization of NASA Earth observations. End products will be integrated in the USGS and BLM decision making and management processes to more effectively manage herd populations in semiarid ecosystems.

Minnesota & Texas Agriculture

Colorado – Fort Collins

Community Concern: The USDA is tasked with collecting, preserving, and making available for research an array of crucial species as a means to conserve genetic diversity and to bolster both national and global food security as well as rural economic productivity. Currently, there is limited geographic information for crop wild relatives' species distribution. Identifying historic and current crop wild relatives' distributions by utilizing species distribution models fit with data captured by NASA Earth observations and can provide resource managers with additional information to pursue more targeted and effective species conservation strategies.

Partners:

- USDA, Agricultural Research Service, National Plant Germplasm System

Earth Observations:

- Terra MODIS
- Landsat 4/5 TM
- Landsat 8 OLI
- SRTM
- Sentinel-2 MSI

Impact & Benefit: This project will save the USDA time and money by further refining monitoring and field survey collection efforts. The project also enables future analysis across larger scales and new species and study sites that would not be possible without full utilization of NASA Earth observations. End products will be integrated in the USDA decision making and conservation processes.

North Dakota & Georgia Agriculture & Food Security

California – JPL & Virginia – Langley

Community Concern: The USDA ARS is responsible for finding solutions to agricultural problems from field to table. ARS conducts research to assess crop productivity and so they are working on improving their models for crop classification to quantify field- and plot-level productivity with an addition to SAR applications.

Partners:

- USDA, ARS, Southeast Watershed Research Laboratory
- USDA, ARS, Northern Great Plains Research Laboratory
- USDA, National Agricultural Statistics Service, Spatial Analysis Research Section

Earth Observations:

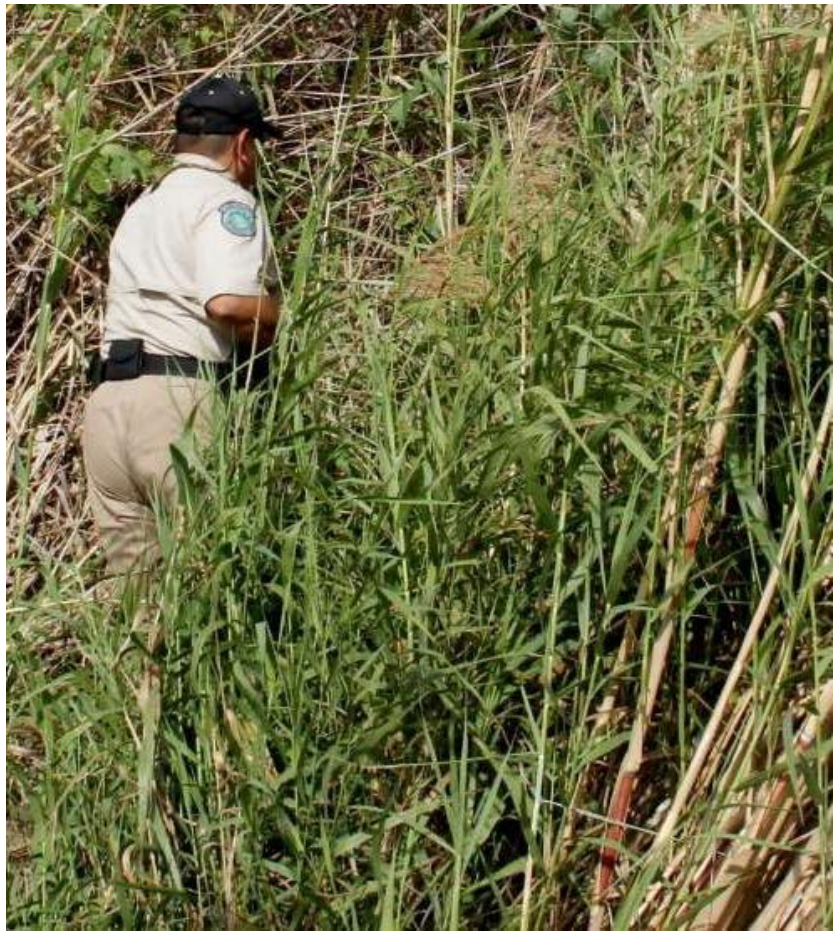
- ALOS-PALSAR
- ERS-2
- RADARSAT-1
- JERS-1
- Sentinel-1 C-SAR
- Sentinel-2 MSI
- Landsat 5 TM, Landsat 8 OLI
- Terra ASTER

Impact & Benefit: This project will help SEWRL and NGPRL build its capacity to use both SAR- and multispectral-based crop classification methods for the modeling and upscaling of location-specific crop lands to the regional level.

Amistad Ecological Forecasting

Virginia - LaRC

Community Concern: The NPS is tasked with maintaining and managing the original ecosystems and vegetation regimes within protected areas. To combat the threat of invasive species, the park requires the most up-to-date science available to make informed decisions about active management practices for invasive giant cane.



Partners:

- National Park Service, Amistad National Recreation Area

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- Sentinel-2 MSI
- Sentinel-1 C-SAR

Impact & Benefit: Amistad National Recreation area can use the information about historic and current distribution of giant cane to better plan their biological control management efforts, focusing on newly formed stands that have a greater likelihood of successful eradication.

Kenai Peninsula Ecological Forecasting

Maryland - Goddard

Community Concern: Over the past 60 years, mean average temperatures in Alaska have increased by an average of 1.7°C. As a result, woody vegetation has begun to colonize wetland and alpine habitats. Wetland afforestation is changing both fire regime patterns and the habitat available to wetland-associated species.

Partners:

- US Fish and Wildlife Service, Kenai National Wildlife Refuge

Earth Observations:

- Landsat 5 TM
- Landsat 8 OLI
- Sentinel-2 MSI
- SMAP Radiometer
- SRTM
- GLiHT

Impact & Benefit: A classification of vegetation types along with a change detection analysis of alpine and lowland wetlands will support refuge staff in decisions affecting the active management of alpine wildlife species (i.e. caribou, dall sheep, and ptarmigan) and habitats, as well as fire management strategies, such as the placement of fuel breaks, to manage wildfire in the future.

Alaska Disasters

North Carolina – NCEI

Community Concern: Wildfires are a common occurrence in the state of Alaska. To add to this, Alaska is warming at a rate roughly twice that of the rest of the country. In order to help decision makers predict where wildfires are likely, they need to know where snow is melting and when.

Partners:

- Alaska Interagency Coordination Center
- NOAA Regional Climate Services, Alaska Region
- National Weather Service, Alaska Region

Earth Observations:

- Terra MODIS
- Aqua MODIS
- Suomi-NPP VIIRS

Impact & Benefit: Our team will create a tool that can be used to calculate snow melt in near real time and generate maps within a pre-existing fire risk estimation system already in use for the state of Alaska.

Carolina Disasters

North Carolina – NCEI

Community Concern: Extreme rainfall often has a profound impact on infrastructure in the Carolinas, particularly in many low-lying coastal regions which are prone to flooding. These floods and the other disastrous events created by extreme rainfall can severely damage critical assets and infrastructure as well as threaten vulnerable populations.

Partners:

- NOAA, Office for Coastal Management
- University of North Carolina Asheville, National Environmental Modeling and Analysis Center

Earth Observations:

- GPM
- TRMM
- PERSIANN

Impact & Benefit: Long-term precipitation data will be used to contextualize extreme rainfall and predict at risk areas throughout the Carolinas, to inform future disaster management planning against flood events.

Southeastern US Disasters

Alabama - Mobile

Community Concern: *Ips* and Southern Pine bark beetles can be troublesome pests capable of causing extensive forest mortality in the southeastern United States, especially during prolonged drought conditions that cause water stress to coniferous trees. Not only can the bark beetles alter and impact forest ecosystems by killing overstory pine trees, the disturbed forests also are at higher risk for wildfires. The increased threat of wildfire is an additional factor that land managers in the southeast must be aware of when managing public and private lands.

Partners:

- USDA, US Forest Service, Eastern Forest Environmental Threat Assessment Center (EFETAC)

Earth Observations:

- Aqua MODIS
- Terra MODIS
- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI & TIRS
- Sentinel-2 MSI

Impact & Benefit: Additional use of higher resolution data to examine vegetation change and coniferous forest type mapping products could help managers enhance forest health assessments and management practices conducted at a more local, site-specific scale, providing higher-resolution data products for forests in the study area being stressed by drought and damaged by *Ips* and Southern Pine bark beetle attacks.