DEVELOP

2021 Spring Preview

Health & Air Quality

Water Resources

Urban Development

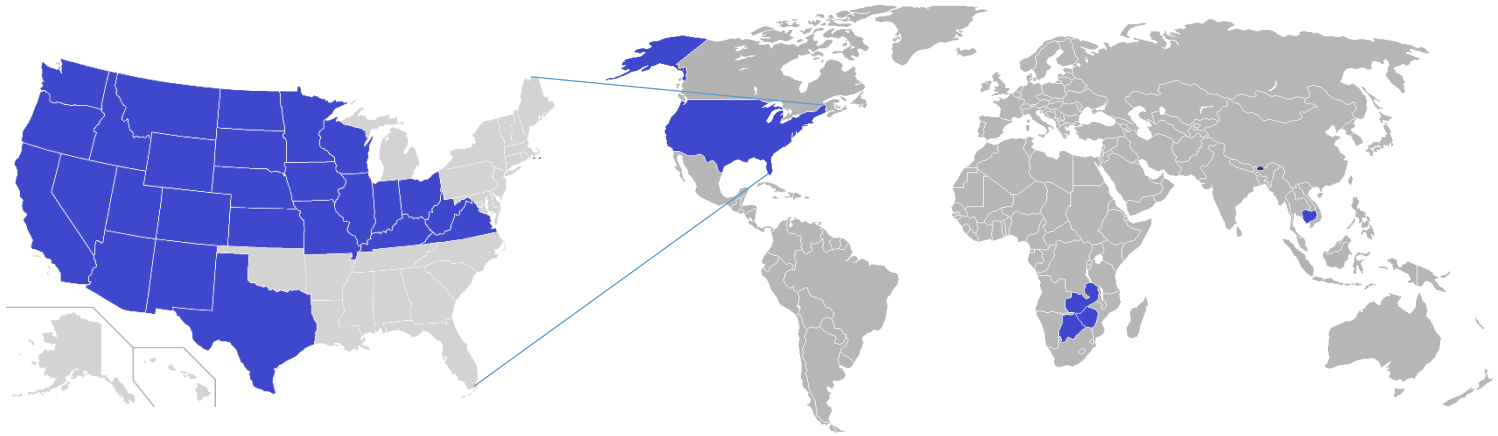
Food Security & Agriculture

Disasters

Ecological Forecasting

DEVELOP 2021 Spring Portfolio

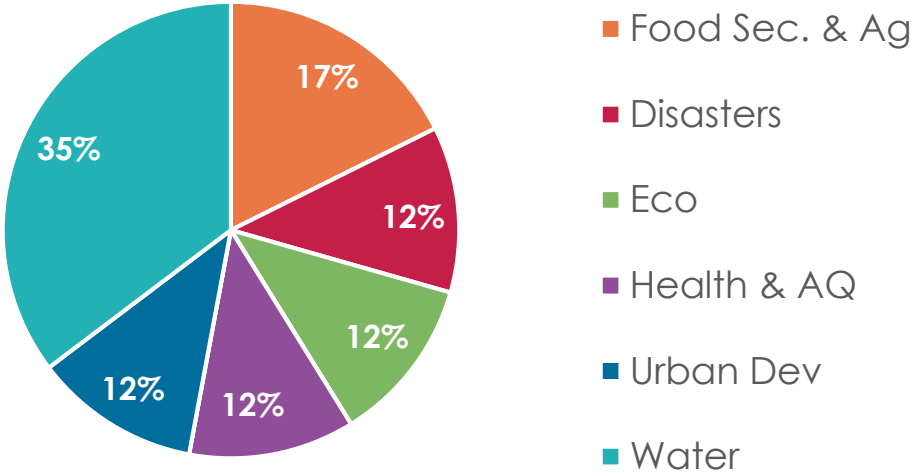
25 States & 6 Countries Impacted



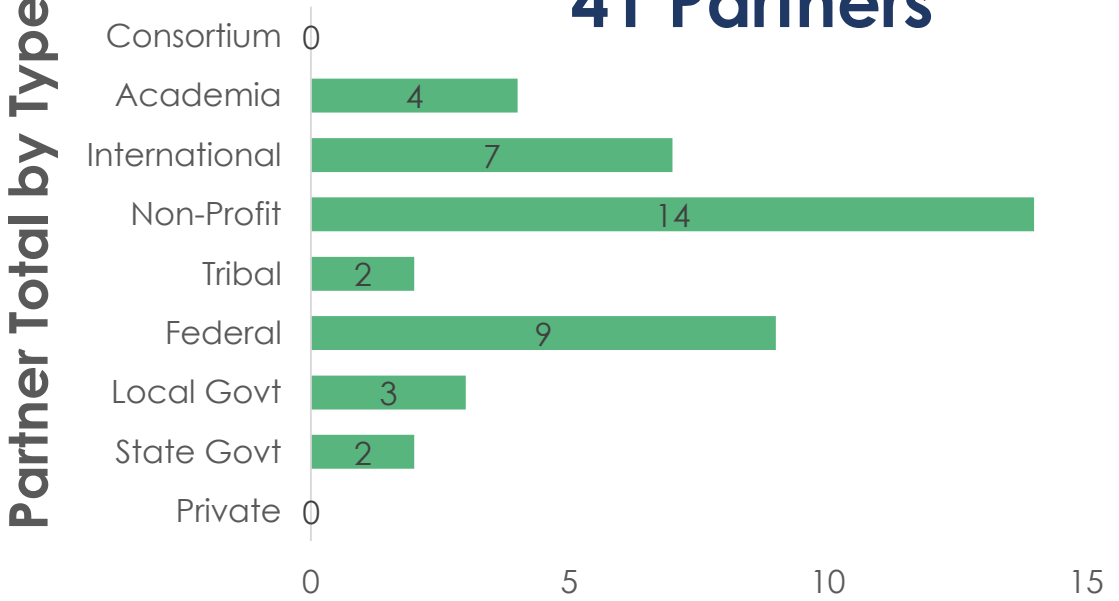
71 Participants
17 Projects

76% Domestic
24% International

Application Areas Addressed



41 Partners



**Impacts and partners are tentative*

Southern Idaho Health & Air Quality II

Community Concern: Wildfires are increasing in size and frequency across the Western US. The smoke from these wildfires impacts air quality and human health and more research is needed.

Partners:

- NOAA NWS Fire Weather Program
- NPS Fire Management Program Center
- BLM National Interagency Fire Center

Earth Observations:

- CALIPSO, CALIOP
- SUOMI NPP VIIRS
- Terra/Aqua MODIS

Impact: A tool for measuring satellite-observed atmospheric mixing heights of smoke aerosols from wildfires assists partners in validating current prediction methods, thus leading to more standardization across agencies and a better understanding of how wildfire smoke travels and impacts air quality, ultimately informing go or no-go decisions about prescribed burns.

Austin Health & Air Quality

Community Concern: Urban heat is a large issue for Austin, TX as the city's climate continues to change and the rapid influx of new residents contributes to its urban development. Extreme heat has increased the number of heat-related illnesses and deaths primarily in socially-vulnerable communities.

Partners:
- City of Austin, Office of Sustainability
- The University of Texas at Austin
- UT Health Houston

Earth Observations:
- Landsat 8 TIRS/OLI
- Sentinel-2 MSI
- Aqua MODIS
- Terra ASTER


Ryan Duffy


NASA

Impact: The end products from this project will provide the City of Austin information for policy and infrastructure decision making to target mitigation efforts in vulnerable areas by creating an urban heat score metric derived from EOs and socioeconomic metrics. This will assist the partners in communicating prioritization needs across city departments and to residents.

Cincinnati & Covington Urban Development

Community Concern: Cincinnati, Ohio and Covington, Kentucky are both densely populated urban environments, making their local communities vulnerable to extreme urban heat.

Partners:
- Groundwork USA
- Groundwork Ohio River Valley

Earth Observations:
- Landsat 8 TIRS
- ISS ECOSTRESS

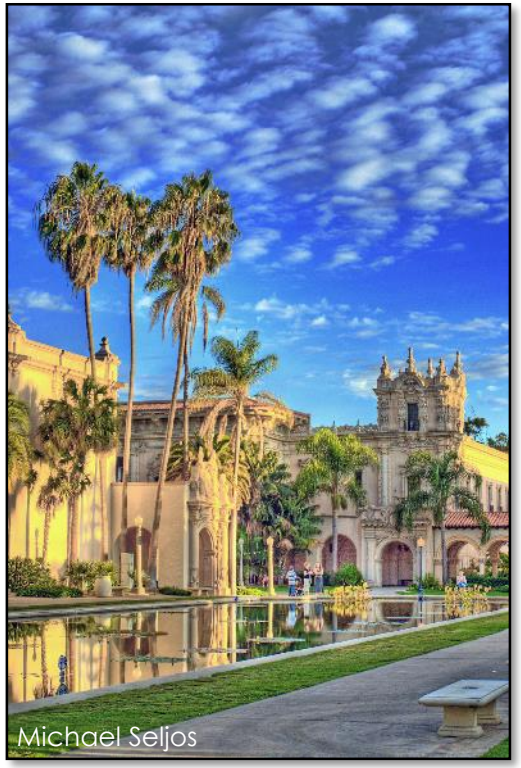
Impact: The first term of this two-term project will help partners better assess heat-related vulnerabilities in Cincinnati and Covington. The project methodologies will support Groundwork in generating consistent and reproducible heat vulnerability analyses for any of its trusts nationwide.

San Diego Urban Development

Community Concern: Current climate projections for San Diego, CA indicate increased heat will be a chief concern for the city as the climate continues to change. Currently, heat related hospitalizations and morbidity are on the rise as many residents along the coast do not have access to air conditioning.

Partners:
- City of San Diego
- American Geophysical Union, Thriving Earth Exchange

Earth Observations:
- Landsat 8 OLI/TIRS
- ISS ECOSTRESS
- Sentinel-2 MSI



Impact: The results of this project will support the City of San Diego efforts to target their climate adaptation strategies in local communities. The end products will support their climate mitigation efforts to build a foundation for a future app that would enable residents to search heat vulnerability in their area.

Arizona – Tempe

Western Montana Ecological Forecasting

Community Concern: Contaminants including flame retardants, pharmaceuticals, and heavy metals easily travel up the food chain and threaten Western Montana's riverine ecosystems.

Impact: Habitat suitability models generated for mink, otter, and fisher will guide Working Dogs for Conservation in its effort to efficiently collect contaminant samples from mustelid scat in Western Montana.

Partners:

- Working Dogs for Conservation

Earth Observations:

- Landsat 8 OLI
- Terra MODIS
- GPM IMERG
- SRTM
- SMAP

Maryland – Goddard

Southern Bhutan Ecological Forecasting II

Community Concern: Elephants are ecosystem engineers whose conservation is essential for the functioning of forest ecosystems. However, the Asian elephant (*Elephas maximus*) is listed as Endangered on the IUCN Red List and faces threats of extinction throughout its range.

Earth Observations:

- Landsat 8 OLI
- Landsat 7 ETM+
- Landsat 5 TM
- Sentinel–2 MSI
- SRTM
- Terra MODIS
- Planet

Partners:

- Bhutan Tiger Center
- Bhutan Foundation

Impact: This second term project will build upon the land use land cover maps and habitat suitability models generated during the summer 2020 term. The end products will inform the placement of biological corridors connecting protected areas in Bhutan for migrating elephant populations.

Maryland – Goddard

Coastal California Water Resources

Community Concern: Estuaries are vital ecosystems that provide habitat for endangered species and naturally filter water contaminants. The Marine Life Protection Act protects estuaries in California by establishing a network of marine protected areas (MPAs) and monitoring these habitats.


Image Credit: Brandon Levinger

Partners:

- Ocean Protection Council
- Southern California Coastal Water Research Project
- Moss Landing Marine Laboratories, Central Coast Wetlands Group

Earth Observations:

- Landsat 8 OLI
- Sentinel-2 MSI
- Sentinel-1 C-SAR

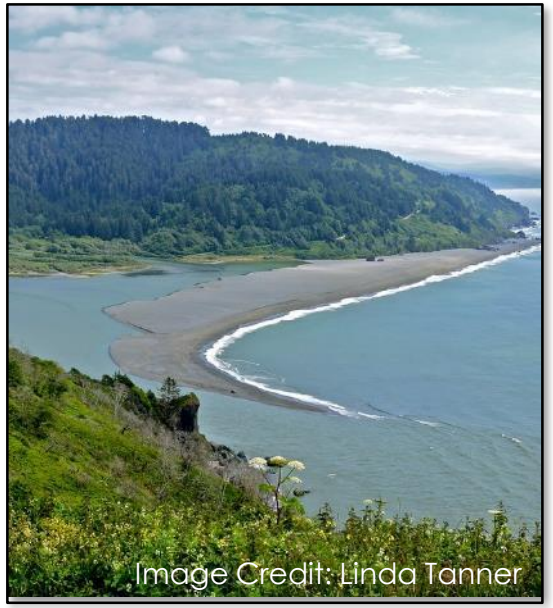


Image Credit: Linda Tanner

Impact: This project will aid the Ocean Protection Council's monitoring efforts, which are mainly based on *in situ* data collection, to assist the state California's restoration efforts.

California – JPL

Montana Water Resources II

Community Concern: In recent years, both drought and flood events have resulted in billions of dollars of disaster-related losses for Montana and the Missouri River Basin. Antecedent moisture conditions in the fall and winter influence the potential for flood and drought events in the spring and summer.

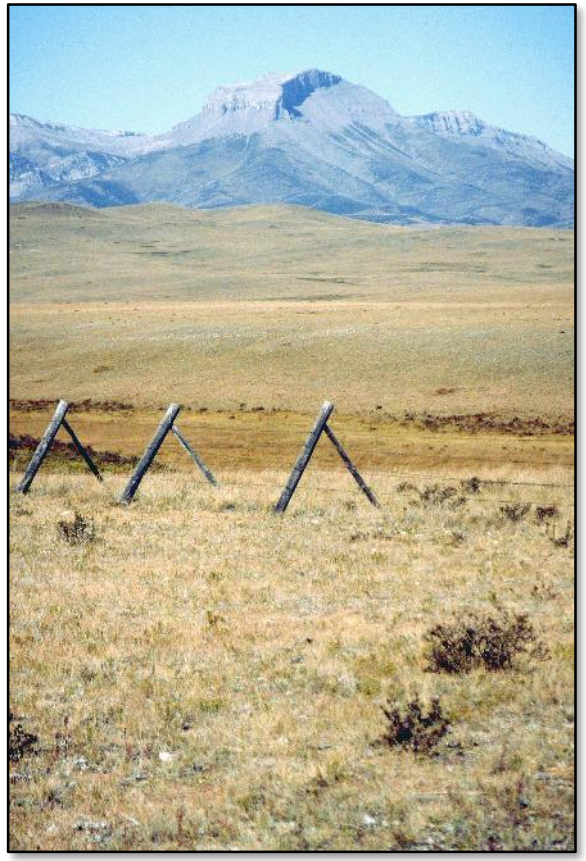
Partners:

- Montana Climate Office
- NOAA National Weather Service – Missouri Basin River Forecast Center
- NOAA Regional Climate Services – Central Region
- NOAA Physical Sciences Laboratory

Earth Observations:

- Terra MODIS
- SMAP
- Suomi NPP VIIRS

Impact: This project will build upon a regional Composite Moisture Index focused on fall/winter moisture conditions. Testing the relationship between this index and spring/summer stream discharge will help climatologists and hydrologists identify strengths and limitations of the metric and enhance their efforts for early monitoring of potential flood and drought conditions.



North Carolina – NCEI

Bhutan Water Resources II

Community Concern: The Bhutan HEROES project employs a combination of weather data collection and citizen science to help understand climate change. There is a need to incorporate satellite data to better understand how the local climate is changing.

Partners:

- Ugyen Wangchuck Institute for Conservation and Environmental Research (Bhutan)
- Karuna Foundation
- Bhutan Foundation

Earth Observations:

- Aqua MODIS
- Terra MODIS
- NOAA AVHRR

Impact: The results from the project will assist the Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER) to bolster the efforts of HEROES to monitor climate change and its impact on the Himalayan mountain ecosystem. This project will expand on educational outreach and help raise awareness for climate change mitigation.


Image Credit: Karma Dema

Alabama – Marshall

Cheat Water Resources

Community Concern: In recent years flooding along the Cheat River has increased, causing property damage. Following the 2016 flood events and changes to local climate, such as warmer temperatures and increased precipitation, there is concern that intense flooding events could take place along the Cheat River in north central West Virginia again.


Image Credit: Williams

Partner:
- Friends of the Cheat

Earth Observations:
- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- GPM IMERG

Impact: Friends of the Cheat can efficiently and effectively begin to strategize on increasing flood resiliency for critical areas. This project will benefit the organization by providing knowledge, new skills, and deliverables that will aid the development of resiliency efforts, future management, and restoration activities in the Cheat River over the next 50 years.

Fairfax Water Resources

Community Concern: In the Summer of 2019, Fairfax County, VA suffered severe flash flooding that inflicted damages on homes, businesses and infrastructure. This prompted the County to declare a local emergency and seek federal disaster aid.

Impact: The partner intends to quantify flood risk within Fairfax County to prioritize improvements that protect residents' lives and property. Understanding the factors that contribute to flood risk allows County officials to explore appropriate infrastructure options for flood mitigation.

Partner:

- Fairfax County, Department of Public Works and Environmental Services

Earth Observations:

- Landsat 5 TM
- Landsat 8 OLI
- Sentinel-2 MSI
- Sentinel-1 C-SAR
- GPM IMERG
- TRMM TMPA
- SMAP L-Band Radiometer

Colorado River Basin Water Resources

Community Concern: Invasive species such as Russian olive and tamarisk are very common in the basin and detrimental to local ecosystems. Mapping the extent of these species is necessary to address the problem but is extremely difficult with current resources.

Partners:
- USA Phenology Network
- USGS, Fort Collins Science Center
- Educating Children Outdoors

Earth Observations:
- Landsat 8 OLI
- Sentinel-2 MSI
- Aqua & Terra MODIS
- PlanetScope

Impact: Understanding the phenology of these species and using corresponding imagery is vital for mapping efforts. Resulting maps will assist landowners to better address the invasive species.

Midwest Food Security & Agriculture

Community Concern: Crop insurance protects farmers, who can file claims for losses when weather events or anomalies destroy their prevalent, large-grain crops such as corn. However, small-grains crops like oats, wheat, barley, and rye cannot be insured as easily because of a lack of data, leading many farmers to avoid planting these crops.

Earth Observations:

- Aqua & Terra MODIS
- GPM IMERG
- SMAP L-Band radiometer
- Sentinel- 2 MSI

Partners:

- Practical Farmers of Iowa
- USA National Phenology Network
- USDA Agricultural Research Service

Impact: Phenological curves of the standard growing season for small-grain crops will allow the partners to advocate for data-backed insurance coverage, empowering them to diversify farmlands and eliminate monocultures and their associate environmental problems.

Georgia – Athens

Africa Food Security & Agriculture II

Community Concern: In the Kavango-Zambezi area, urban development and shifts in the severity and length of the dry seasons increasingly drive free-ranging elephants from national parks to developed areas. In these areas, elephants threaten residents, damage property, eat refuse from landfills, and raid the crops of subsistence farmers.

Partners:

- Connected Conservation, South Africa Office
- The Ecoexist Project

Earth Observations:

- Landsat 8 OLI
- SMAP L-Band Radiometer
- GPM IMERG
- SRTM DEM

Impact: The project end products will assist local NGOs to identify where and when agricultural expansion and development overlaps with elephant habitat in order to reduce human-elephant conflict and promote coexistence.

Tonlé Sap Food Security & Agriculture

Community Concern: Water pumped from the Tonlé Sap Lake is essential for crop irrigation by nearby communities. In recent years, farmers have become more reliant on water from the lake as agricultural production increases.

Impact: Water level time series and land-use change maps will support partner assessments of the hydrological implications of land-use change in the region and contribute to policy on agricultural development in the basin.

Earth Observations:

- TOPEX/Poseidon
- Jason-1 Poseidon-2 Altimeter
- Jason-2 Poseidon-3 Altimeter
- Jason-3 Poseidon-3B Altimeter
- AVHRR
- Terra MODIS
- Landsat 5 TM
- Landsat 8 OLI
- GPM IMERG

Partners:

- Cambodia Ministry of Water Resources and Meteorology
- Tonlé Sap Authority
- Asian Development Bank
- World Bank
- Conservation International

Colorado Front Range Disasters

Community Concern: Recent high-severity fires (namely Cameron Peak and CalWoods) have increased the need for better forest treatment to protect local communities and ecosystems.

Impact: The fires burned many forests previously managed and treated with a variety of methods. The team will evaluate the impact of different treatments on the characteristics of the fires and provide land managers with relevant information on the effectiveness of treatments.

Partners:

- Coalition for the Poudre River Watershed
- The Nature Conservancy
- Ben Delatour Scout Ranch
- Colorado State Forest Service
- CSU, Dept. of Forest and Rangeland Stewardship

Earth Observations:

- Landsat 8 OLI
- Sentinel-2 MSI
- GOES-17
- MODIS & VIIRS
- SRTM

Northern Great Plains Disasters

Community Concern: The Northern Great Plains have experienced an increase in catastrophic flooding events in the last 50-70 years, including record precipitation levels in 2019, and is projected to continue to increase under a changing climate scenario.


Image Credit: Erin Bormett

Partners:

- Rosebud Sioux Tribe Water Resources Office
- Great Plains Tribal Water Alliance
- NASA Indigenous Peoples Pilot

Earth Observations:

- Landsat 8 OLI
- Landsat 5 TM
- Sentinel-1 C-SAR
- GPM IMERG

Impact: As changes to infrastructure to support disaster response are costly and longer-term, geospatial assessments of flood risks can be key in disaster preparedness and resilience. The end products will assist partners in identifying areas at risk for flooding to better inform disaster resilience efforts.