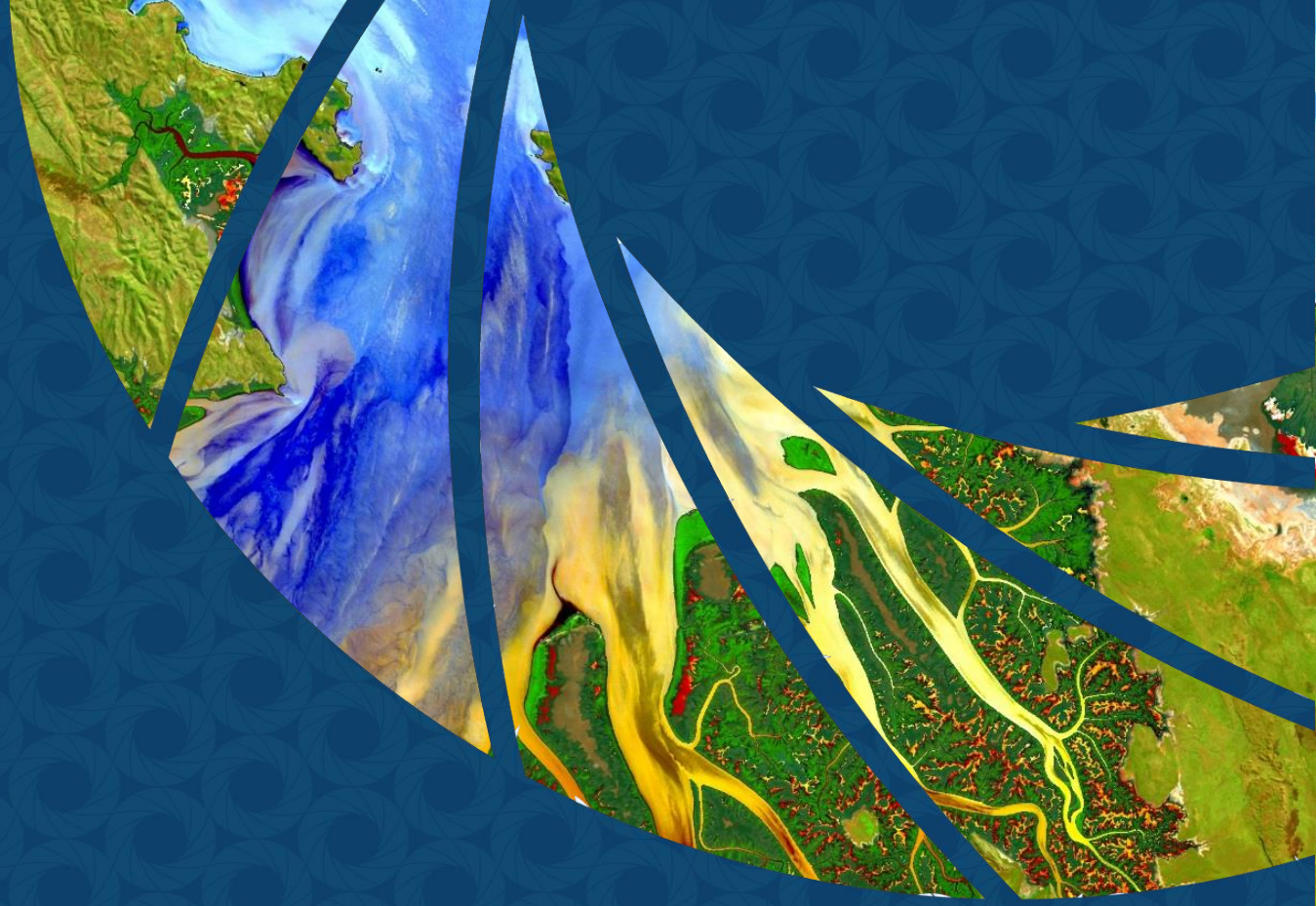


DEVELOP National Program

2016 Fall Term Preview

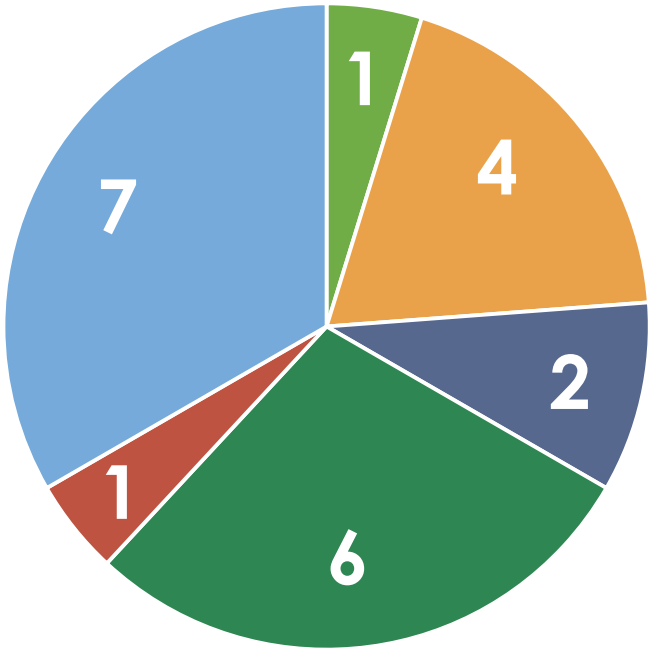
Sept 7th, 2016

AGENDA

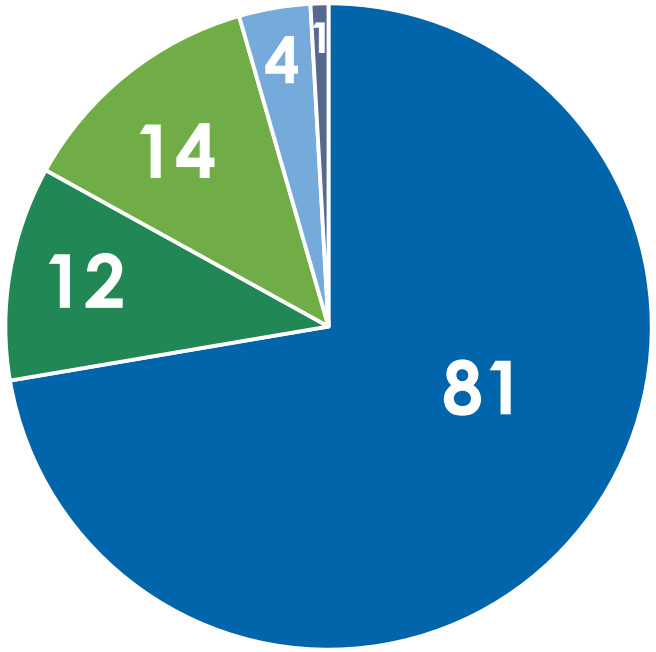
- Fall Overview
- Project Previews
  - Agriculture
  - Climate
  - Disasters
  - Ecological Forecasting
  - Health & Air Quality
  - Water Resources
- Term Calendar

Fall Overview

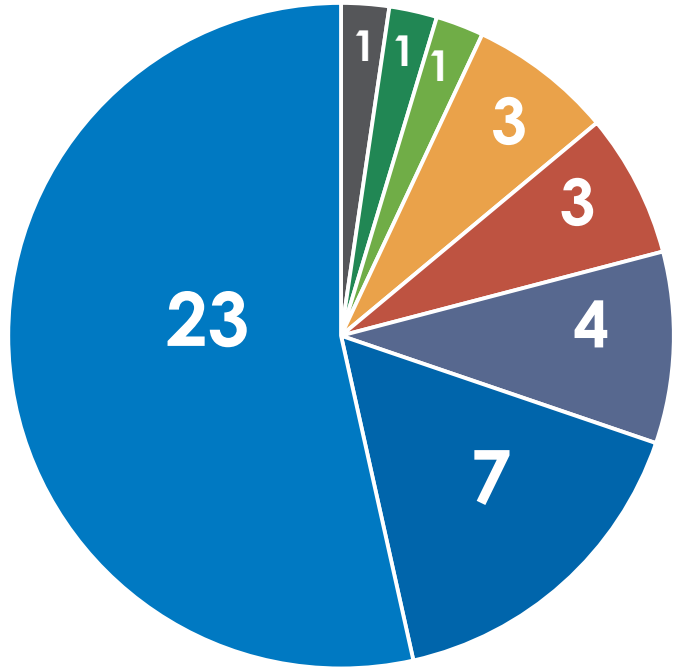
21
Feasibility Projects



112
DEVELOPers



43
Partner Organizations



Costa Rica Agriculture II

Community Concern: Agriculture represents over 70% of the consumptive use of water worldwide. Satellite-based remote sensing provides an opportunity to help optimize water use by improving understandings of water stress conditions in croplands so that water resources can be used more efficiently.

Partners:

- Earth University, Costa Rica
- USDA-ARS U.S. Arid-Land Agricultural Research Center

Earth Observations:

- Suomi-NPP VIIRS
- ASTER GED
- Aqua (MODIS)
- Terra (MODIS)

Impact & Benefit: This project will optimize irrigation practices, which will save water and cost, and allow them to allocate resources elsewhere.

Glacier National Park Climate

Community Concern: Glacier National Park is interested in developing a spatial database that relates landscape-level disturbances to climate-related effects across the park. By synthesizing known and unknown disturbances, the park will be able to better address and focus management resources to respond to disturbances within the park.

Impact & Benefit: The end-user will gain updated distribution maps of current forest health, as well as a map of changes in vegetation from 1999 to 2016, which will provide a more holistic understanding of the changes in and current distribution of vegetation within the park.

https://www.nps.gov/common/uploads/grid_builder/imr/crop16_9/DA3C1F02-1DD8-B71B-0BEA9E07D90D3888.jpg?width=950&quality=90&mode=crop

Partners:

- NPS, Glacier National Park
- NASA Ames, Biospheric Branch

Earth Observations:

Landsat 5, 7, & 8

DEVELOP @ NASA Langley Research Center

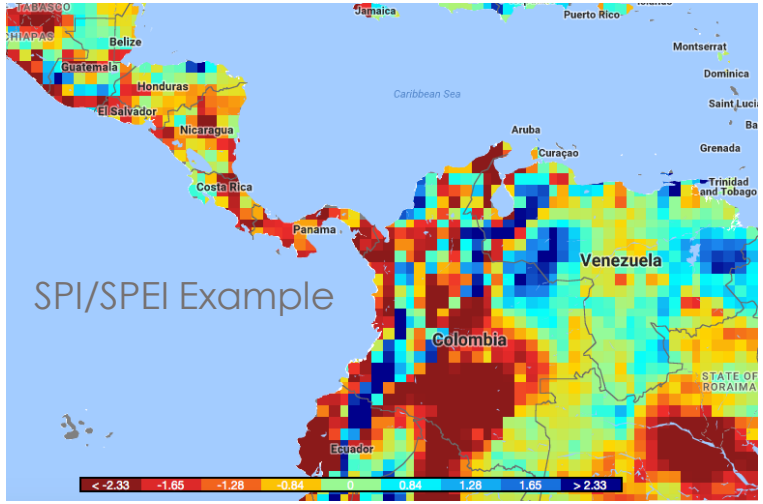
Levant & Central America Climate II

Community Concern: Drought events in the Levant and Central America increase stress on water resources and impact food security. These events can exacerbate conflicts and create a need for international aid. The U.S. Air Force and Department of Defense need a better understanding of the relationship between drought and vegetative health in these two regions.

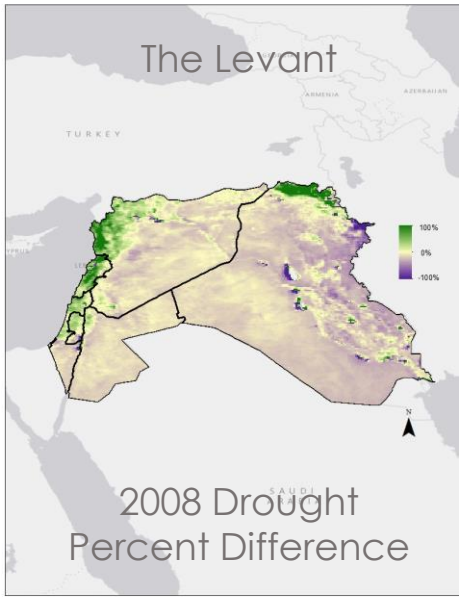
Partners:
US Air Force, 14th Weather Squadron

Earth Observations:
- NOAA - NDVI (AVHRR)
- Aqua & Terra - NDVI or EVI (MODIS)

Ancillary Datasets
- Standardized Precipitation Index (SPI)
- Standardized Precipitation-Evapotranspiration Index (SPEI)



SPI/SPEI Example



2008 Drought
Percent Difference

1997 El Niño
Percent Difference

Impact & Benefit: The Levant & Central America I team created vegetation climatologies and analyzed trends in vegetative health for both regions. The upcoming project will quantify the relationship between satellite vegetation data and drought. The second team will also seek to create a new drought index for the 14th Weather Squadron.

DEVELOP @ NOAA National Centers for Environmental Information

Navajo Nation Climate III

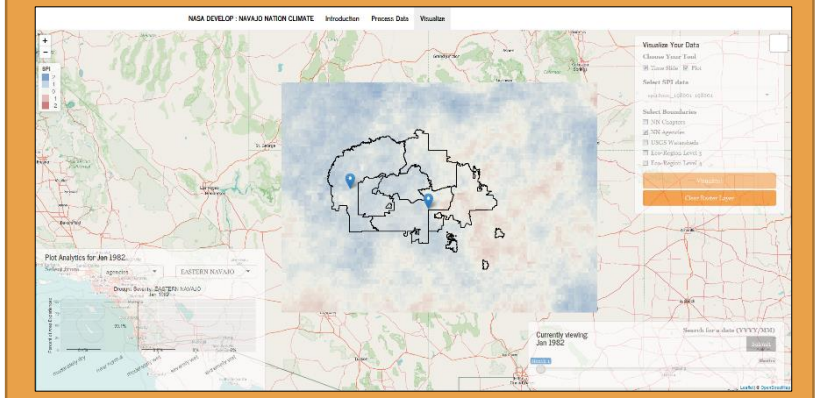
Community Concern: Climate change impacts in the Southwestern US are predicted to disproportionately affect the Navajo Nation, with substantial issues in regard to water resource availability. Currently, about 70,000 Navajo residents (~1/3 of the Reservation) does not have access to running water.

Partners:
Navajo Nation Department of Water Resources (NNDWR), Water Management Branch

Earth Observations:

- Aqua, Advanced Microwave Scanning Radiometer (AMSR-E)
- Advanced Microwave Scanning Radiometer 2 (AMSR2)
- Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS)

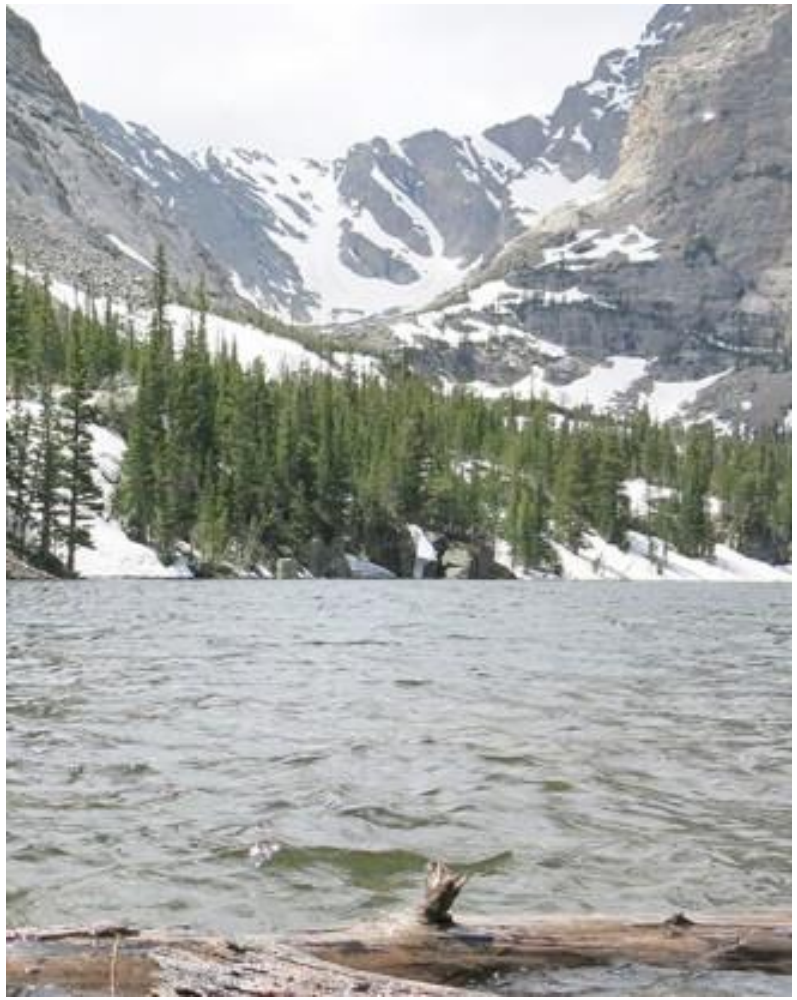
Impact & Benefit: The third term of this project (Fall 2016) will build upon the last two terms to analyze long-term drought trends using the Drought Severity Assessment Tool and compare against snow water equivalent trends in the Navajo Nation. This will provide a more comprehensive understanding of the climate regime and inform future drought monitoring efforts.



DEVELOP @ NASA Ames Research Center

Rocky Mountain National Park Climate

Community Concern: Despite park protection, alpine lakes, particularly those nearest to agriculture and urban areas, have received atmospheric nitrogen deposition from snow and rain since 1960. The nitrogen has fertilized the lakes east of the Continental Divide, altering their abiotic and biotic compositions, making them slightly more biologically productive. Since 2005, however, primary productivity appears to have greatly increased, causing the lakes to become murky and green.



Partners:

- Rocky Mountain National Park
- United States Geological Survey, Fort Collins Science Center

Earth Observations:
Landsat 8, Sentinel-2, Worldview 2

Impact & Benefit: Findings from this project will be used by RMNP to inform State and EPA policy for managing other human-caused disturbances, such as air pollution. The USGS will gain invaluable scientific knowledge of the extent of change from the interactions of climate change and atmospheric deposition.

Ethiopia Disasters

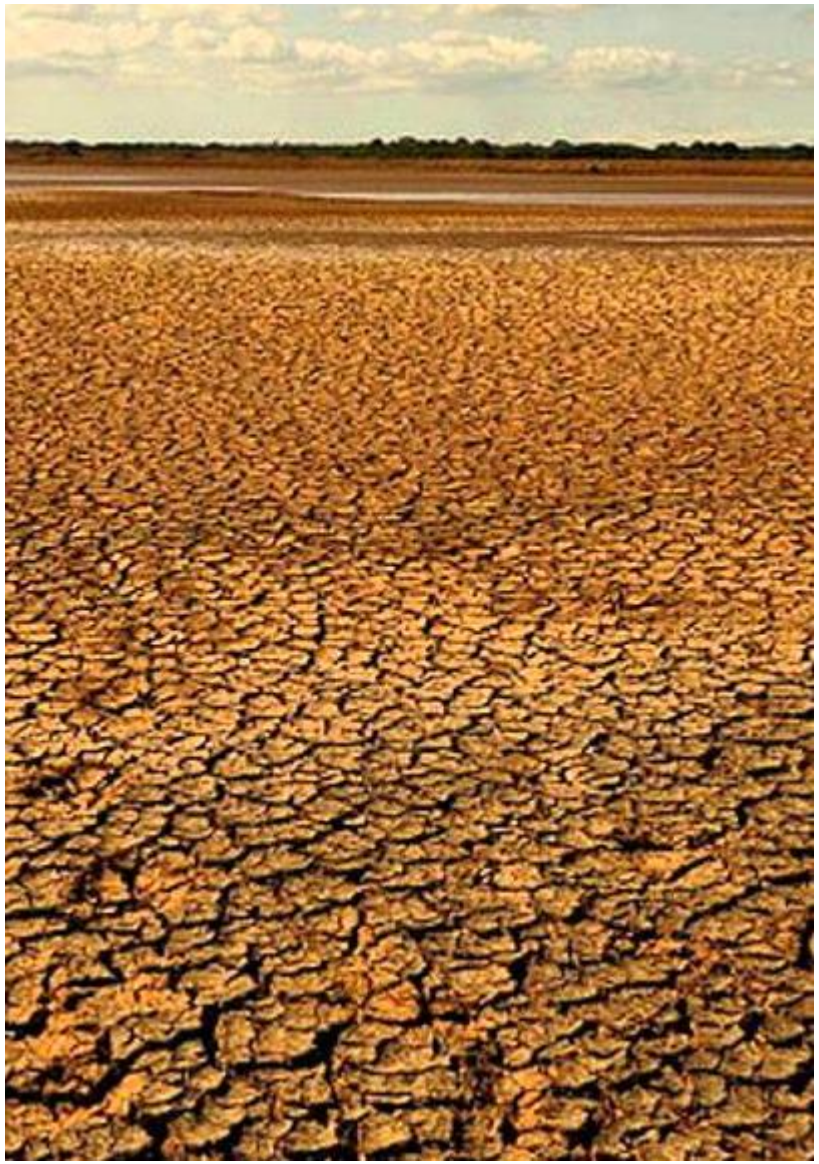
Community Concern: The ongoing drought in Ethiopia is a result of extreme El Niño weather patterns in 2015 that created the worst drought in half a century. Massive crop failures, primarily in the central and eastern portions of the country, have left over 10 million people currently in need of emergency food assistance

Partners:

- US Department of State Office of Space and Advanced Technology (OES/SAT) and Humanitarian Information Unit (HIU)
- Institute of Geo-Information and Earth Observation Sciences (I-GEOS)- Mekelle University
- USGS North Central Climate Science Center

Earth Observations:
Aqua/Terra MODIS, SRTM, Landsat 8 OLI/TIRS, Landsat 7 ETM+, Landsat 5 TM, SMAP, TRMM TMI, GPM IMERG

Impact & Benefit: This project will enable I-GEOS and the US Department of State OES/SAT and HIU to support future drought management efforts in Ethiopia and perform finer scale assessments of impacted areas.



Mississippi River Basin Disasters

Community Concern: Disaster response and relief organizations need to gather data and maps used in their decision making process to prioritize areas requiring aid as well as needing to map total affected areas for the purposes of estimating damage and recovery costs.

Partners:

- NASA Short-term Prediction Research and Transition Center (SPoRT)
- USGS Hazards Data Distribution System
- Federal Emergency Management Agency (FEMA)

Earth Observations:
Landsat 5 TM, Landsat 8 OLI, Terra ASTER, EO-1 ALI, Sentinel-2 MSI

Impact & Benefit:
The Flood Extent Map and the Flood Probability Algorithm will be useful for a more timely response to extreme flood events. Additionally, relief organizations will be able to focus their funds on the recovery efforts instead of using them to contract out their data and maps.

Source: NASA Earth Observatory

Eastern India Eco Forecasting

Community Concern: Mangroves have been overexploited or converted to other forms of land use. These forests provide valuable services such as food, raw materials, and medicinal and ornamental resources. There is growing concern for the effective management and conservation of these mangrove forests because they support families from 36 villages around the Odisha region.

Partners:

Government of Odisha; DFE; Chilika Development Authority (CDA)

Earth Observations:

- Terra/Aqua MODIS
- Terra ASTER, MERIS, Sentinel-2
- Landsat 5, 7, 8

Impact & Benefit: CDA will receive long-term spatio-temporal estimations of mangrove physiological status. The results will allow them to identify 'hotspots' for early stages of mangrove degradation.

Elkhorn Slough Eco Forecasting II

Community Concern:
About 50% of Elkhorn Slough salt marshes have been lost in the past 150 years.
Increasing sea levels and changing climatic patterns pose a threat to tidal marsh health.

Partners:

- Elkhorn Slough National Estuarine Research Reserve (**ESNERR**)
- United States Geological Survey (**USGS**)

Earth Observations:

- Landsat 5-8 (TM, EMT+, OLI)
- Sentinel-2 (MSI)

Impact & Benefit: The second term of this project (Fall 2016) will assess the effects of sea level rise and climatic variation (ESNO cycles) on blue carbon (carbon sequestration potential of coastal vegetation), marshland extent, and vegetation health in Elkhorn Slough tidal marshes. This will help inform end-users on best locations for future marshland restoration projects.

Everglades Eco Forecasting II

Community Concern: One of the world's most threatened ecosystems are mangrove forests. Due to changing environments, pollution, and human alterations of the land, the health and extent of mangroves continues to decline.

Partners:

- NPS, Everglades National Park
- Group on Earth Observations, Blue Planet Initiative
- ODU, Mitigation and Adaptation Research Institute

Earth Observations:

- Landsat 5, 7, & 8
- Sentinel-2

Impact & Benefit: Products will allow for enhanced monitoring of mangrove extent in the region, and can also be utilized to address the UN's SDG targets relating to mangroves.

http://images.nationalgeographic.com/wpf/media-live/photos/000/936/overrides/everglades-white-pelicans_93683_990x742.jpg

Kenya Eco Forecasting

Community Concern: A substantial amount of international funding goes into biodiversity conservation globally. Estimating the amount of carbon sequestered by protected areas will provide information about the co-benefits of biodiversity conservation through protected areas.

Partners:

Global Environment Facility - Independent Evaluation Office

Earth Observations:

- Landsat 7 ETM+
- Landsat 8 OLI
- Sentinel-2 MSI
- Aqua/Terra MODIS
- SRTM

Impact & Benefit: The study will provide the Global Environment Facility (GEF), its funders, policy makers, and implementing partners (the Kenyan government, UNDP, UNEP, World Bank) with an evaluation of how GEF investments and technical support to protected areas in Kenya is generating synergistic co-benefits for climate change mitigation and help in designing future policy and programmatic approaches.

Southern Arizona Eco Forecasting

Community Concern: Invasive non-native grasses are rapidly spreading throughout national parks in the southwestern U.S. In contrast to sparsely-distributed native vegetation, invasive grasses such as Buffelgrass (*Pennisetum ciliare*)can form large patches that carry fire quickly and broadly across the landscape.

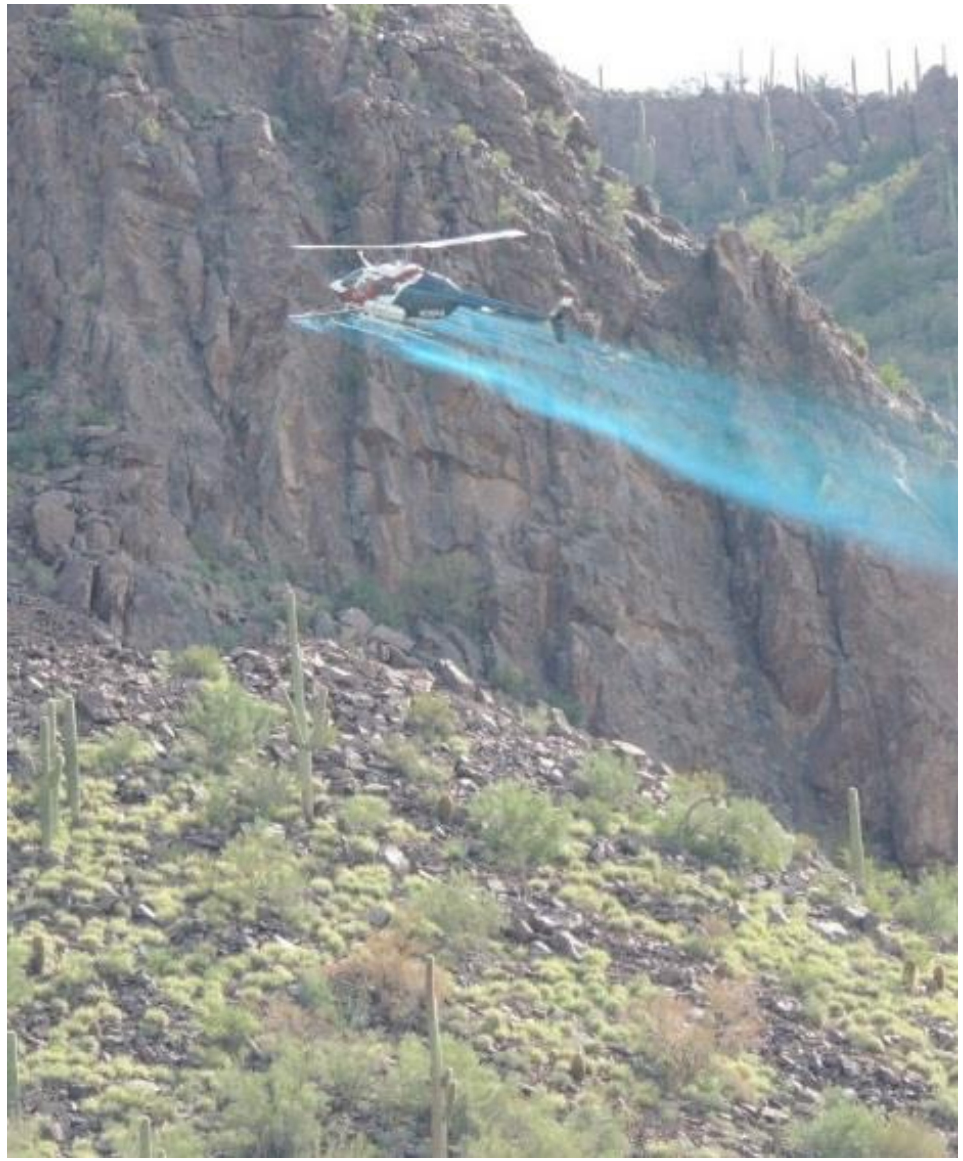
Partners:

- National Parks Service, Saguaro National Park Rincon Mountains District
- USGS Southwest Biological Science Center
- Northern Arizona University (NAU)

Earth Observations:

- Terra MODIS
- TRMM
- GPM

Impact & Benefit: The National Parks Service hope to expand on approaches that they and other agencies can use to detect, monitor, and target buffelgrass for a better optimization of removal treatments in different plant communities and landscape settings.



DEVELOP @ NASA Jet Propulsion Laboratory

Maricopa County Health & AQ

Community Concern: Exposure to air pollution has consistently been associated with respiratory and cardiovascular morbidity and mortality. A spare and unevenly distributed air monitoring network leaves exposure to air particulates unknown for much of the county, especially in rural communities.

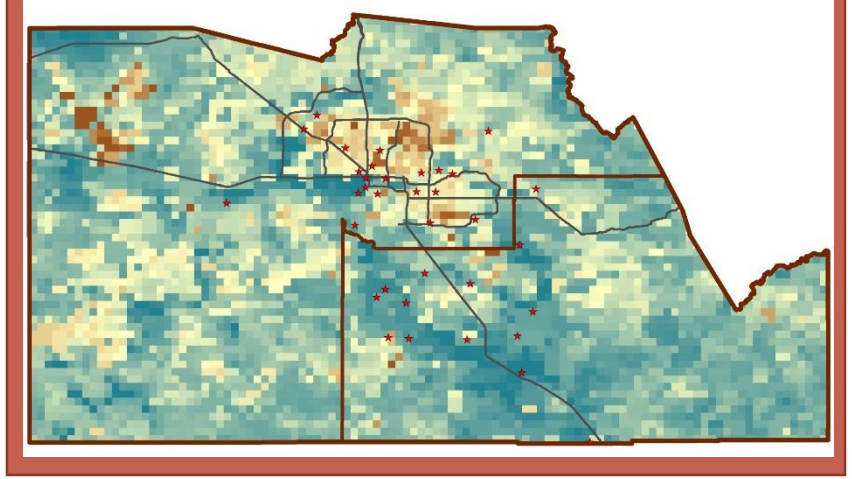
Partners:

- Maricopa County Department of Public Health (MCDPH)
- Maricopa County Air Quality Department (MCAQD)

Earth Observations:

- Aqua/Terra MODIS – Aerosol Optical Depth
- Landsat 8 OLI – Land Use Land Cover
- Suomi NPP VIIRS – Aerosol Optical Depth

Impact & Benefit: The products produced in this term can be used to enhance decision making regarding the addition of future air quality monitors and help maintain that the county stays within EPA required dust compliance. These products can also help our partners better target community intervention and wellness efforts through an improved understanding of the extent and magnitude to which vulnerable communities are exposed to air particulates.



Atlanta Water Resources III

Community Concern: Rapid development in Atlanta and its suburbs is expanding areas of impervious surface that will continue to exacerbate stormwater management problems.

Partners:
The Nature Conservancy

Earth Observations:

- Landsat 8 (OLI, TIRS)
- Terra (ASTER)

Impact & Benefit: Protection of existing green infrastructure or strategically planting more trees to intercept stormwater runoff will help limit future "gray infrastructure" needs at a much higher cost.

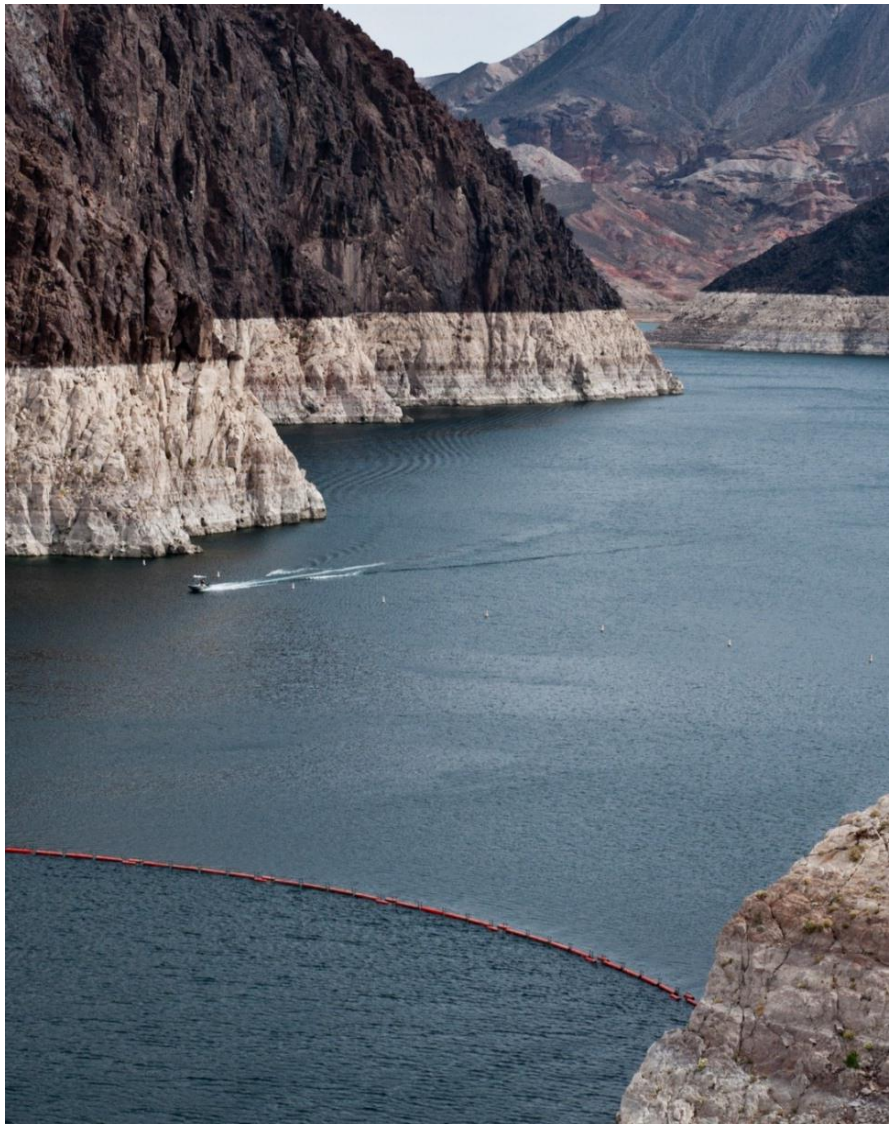
Grand Canyon Water Resources

Community Concern: Over the last 20 years the water level in Lake Mead in Arizona and Nevada has dropped over 50 feet below peak pool level, a historically low level for the lake. This drop in water has exposed thousands of acres of lake bed sediments to the atmosphere. Additionally, the sediment presents a threat to the quality of the drinking water for Las Vegas, NV and the surrounding area.

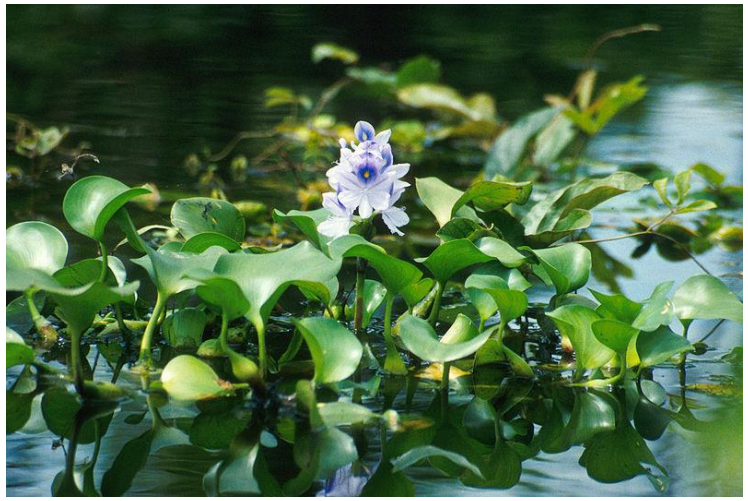
Partners:
National Park Service, Grand Canyon National Park

Earth Observations:
- Landsat 5 TM
- Landsat 8 OLI
- ASTER

Impact & Benefit: Updated LULC map of areas exposed by dropping lake levels.



Lake Victoria Water Resources III



Source: Ted Center

Source: Valerius Tygart

Community Concern: The water hyacinth is an invasive species that has adverse impacts on Lake Victoria including outcompeting native plant species for space and nutrients, restricting boating access, and creating hypoxic zones that kill aquatic life.

Partners:

- NASA SERVIR Coordination Office at MSFC
- NASA SERVIR Eastern and Southern Africa Hub
- Makerere University of Geomatics and Land Management

Earth Observations:
Landsat 5 TM, Landsat 8 OLI, EO-1 Hyperion, Suomi NPP VIIRS, Sentinel-2 MSI, World View 2 & 3

Impact & Benefit: The algorithms and products created will benefit the end users by complementing their research on the water hyacinth and gaining a better understanding on what makes the plant thrive in Lake Victoria, which ultimately will result in future eradication efforts.

North Carolina Water Resources

Community Concern: Falls Lake, located in the Neuse River Basin in North Carolina, provides drinking water for a half million people in Raleigh and six other municipalities. A major concern about Falls Lake is the water pollution due to excessive N and P from wastewater treatment plants, and from suburban developments and farms. Currently, there are only a few sampling stations in Falls Lake where water quality parameters are observed, and the temporal sampling is non-uniform.

Impact & Benefit: The SWAT-based N and P made available from this project will present the City of Raleigh Utility department with a set of water quality parameters. This information will then be used for future watershed monitoring with remote sensing data to forecast near term water quality conditions. This will save the utility money and provide near-real time predictions of water quality impacting hundreds of thousands of people relying on the watershed for their drinking supply.

Partners:

- City of Raleigh Public Utilities Department
- Hazen and Sawyer P.C.
- University of Guelph

Earth Observations:

- GPM/IMERG
- Suomi NPP VIIRS
- Landsat 8 OLI
- Sentinel-2 MSI

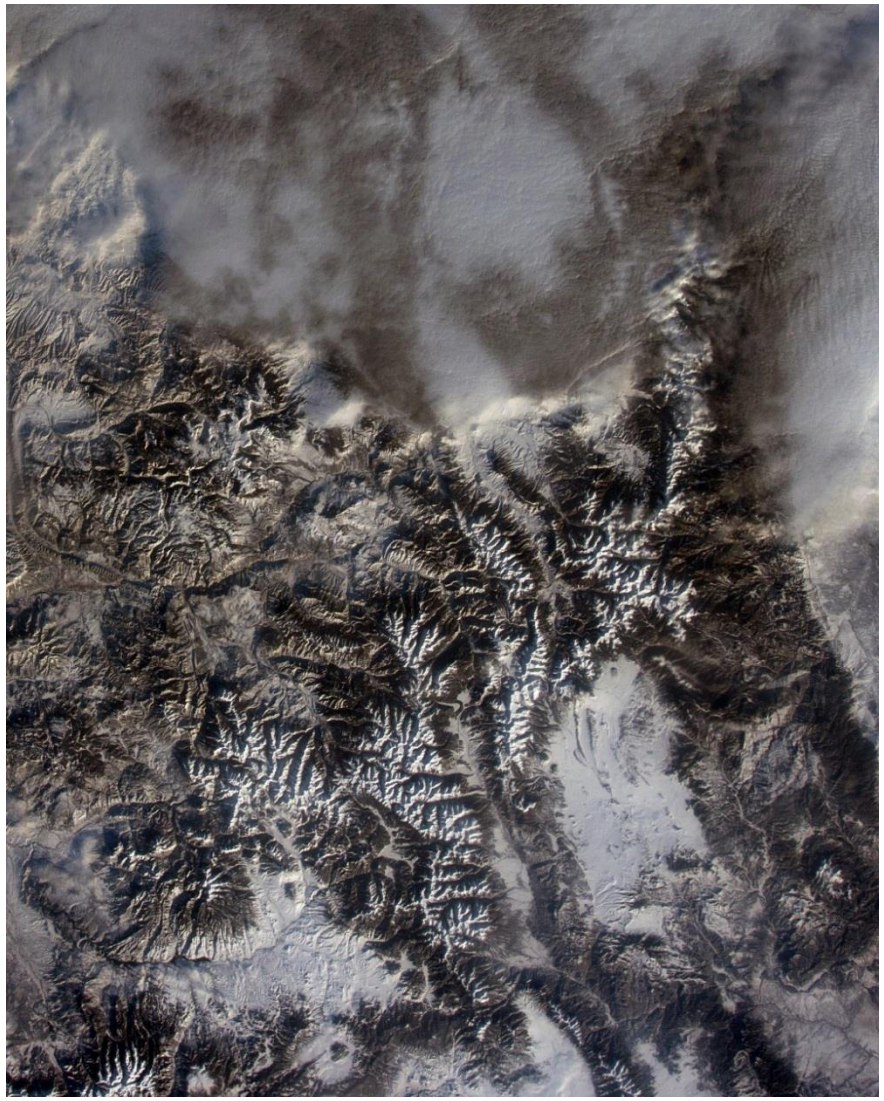
Northern Great Plains Water Resources II

Community Concern: National Parks in the Intermountain region of the northern United States Great Plains region are experiencing snow and ice melt due to changes in climate. As the ice recedes, it has the potential to reveal previously undiscovered archeological sites, as well as alter the vegetation and fire regime of the area.

Partners:
National Park Service, Intermountain Region

Earth Observations:
- Landsat 5 TM
- Landsat 7 TM
- Landsat 8 OLI
- Aqua/Terra MODIS

Impact & Benefit: Aid the NPS in its mission to protect and mitigate for impacts of climate change to mountain cultural heritage resources.



Southeastern Arizona Water Resources

Community Concern: Within the sky island region of Southeastern Arizona, snow cover plays an important role in replenishing streams and rock fractures. Although the National Park Service (NPS)has been monitoring water presence in these streams since the mid-1990s there is a major information gap in the role that snow cover, depth, and timing play in providing water for these streams.

Partners:
National Park Service, Intermountain Region

Earth Observations:

- Aqua/Terra MODIS
- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- Sentinel-2

Impact & Benefit: The NPS does not currently have historical data for snow cover in the sky islands region. Historical maps and analysis of the role that snow plays in the sky islands , will allow park managers to better understand the overall hydrology of Saguaro National Park and the surrounding sky islands.

Southeastern Idaho Water Resources

Community Concern: Idaho has over 95,000 miles of rivers and streams and more than 100 lakes and reservoirs supplying the necessary water for anthropic, economic, and ecological sustenance. As a result, it is important to know the spatial extents of water sources and to understand their flow dynamics in order to improve management decisions.

Partners:

- Bureau of Land Management (BLM) - Pocatello Field Office
- Idaho Department of Water Resources (IDWR)

Earth Observations:

- Landsat 8 OLI
- MERRA
- SRTM Version 2
- TRMM/GPM

Impact & Benefit: Current partner practices utilize the generic National Hydrologic Dataset(NHD), which increase resource cost's and can lead to decisions based on incorrect data. Therefore, Earth observations will decrease required resources and increase decision support by providing current and accurate data.

Western US Water Resources II

Community Concern: Land managers require up-to-date information to plan for, and adapt to, the impacts of climate change, specifically how to identify vegetation shifts associated with a warmer, dryer climate that are early warning signs of changes to ecosystem stability.

Partners:

- NPS, Inventory & Monitoring Program
- USGS, Southwest Biological Science Center

https://www.nps.gov/care/planyourvisit/images/hunting_cathedral-valley.jpg

Earth Observations:

- Terra MODIS
- TRMM, GPM
- SMAP
- GRACE
- SRTM
- ASTER

Impact & Benefit: Products will allow park managers to incorporate a more nuanced understanding of the relationship between multiple climate and vegetation parameters.

Term Calendar

Week 1 (9/12 - 9/16)	**9/16:** Handbook Forms, Participant Info Sheets, Personality Types, Personal Growth Assessment, Personal DEVELOPedia Page Updated
Week 3 (9/26 - 9/30)	**9/29:** Project Summary RD
Week 4 (10/3 - 10/7)	**10/6:** Tech Paper RD
Week 5 (10/10 - 10/14)	**10/10:** Offices Closed **10/13:** Presentation RD
Week 6 (10/17 - 10/21)	**10/20:** Poster RD **10/21:** Software Release Forms (*if applicable*)
Week 7 (10/24 - 10/28)	**10/27:** Project Summary FD, VPS Image, Study Area Shapefiles
Week 8 (10/31 - 11/4)	**11/1:** VPS Video & Transcript **11/3:** DEVELOPedia Project Page Completed
Week 9 (11/7 - 11/11)	**11/10:** Poster FD, Presentation FD **11/11:** Offices Closed
Week 10 (11/14 - 11/18)	**11/17:** Tech Paper FD, Content Innovation, Final Imagery **11/18:** Optional Deliverables, Exit Survey Completed, Personal Growth Assessment

Deliverable Submission

Email

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DEVELOP.ProjectCoordination@gmail.com

Too large for email? Send through NASA LFT or Google Drive

Nomenclature

YearTerm_Node_Team_Deliverable_Draft

Ex. 2016Fall_LaRC_NorthCarolinaWater_Poster_FD

Node Acronyms:
ARC, AZ, FC, GSFC, ID, JPL, LaRC, MCHD, MSFC, NCEI, UGA, WC

App Area Shorthand:
Ag, Climate, Disasters, Eco, HealthAQ, Water

Thank You!