Introduction to Remote Sensing for Scenario-Based Eco-Forecasting
NASA ARSET & North Central Climate Science Center Webinar Series

Date: Four 1-hours sessions held every Thursday 12:00 – 1:00PM EDT (Session A) and 8:00 – 9:00PM EDT (Session B) from September 7 – 28, 2017.

Each day there will be two sessions. Please only sign up for and attend one of the session times based on what is most appropriate for your location.

Course Description:
This webinar will focus on the use of NASA Earth Observations for ecological forecasting. This will include an overview of the sensors and tools relevant to ecological forecasting, the historical and forecasted climate products and consideration of the proper use of climate data for ecological modeling, scenario planning, and the application of species distribution modeling and state-and-transition simulation modeling. This course will review imagery and products from Landsat, MODIS, VIIRS, and Sentinel (from the ESA), and online clime tools such as the US Climate Resilience Toolkit and the Western Water Assessment dashboard.

Learning Objectives: Demonstrate a suite of data and tools (such as NASA Earth observations) for ecological forecasting that better address management needs, including:
- Introduce eco-forecasting and its applications
- Understand how climate data supports future projections of management targets
- Introduce scenario planning as a way to elicit management constraints and objectives within the context of multiple sources of uncertainty
- Integrate qualitative and quantitative tools to support resource management decision-making under uncertainty

Intended audience: Local, regional, state, federal, and international organizations charged with maintaining healthy ecosystems, and interested in ecological forecasting using satellite imagery and climate data. Governmental and Non-governmental organizations in the public and private sectors engaged in environmental management and monitoring will be given preference over organizations focused primarily on research.

Prerequisite: Complete the on-demand "Fundamentals of Remote Sensing" webinars, Sessions 1 and 2 (http://arset.gsfc.nasa.gov/webinars/fundamentals-remote-sensing) or equivalent experience.

Certificate: A certificate will be provided to participants who attend 3 out of 4 webinars and complete all homework assignments by the due date.

Session 1 (September 7): Overview of Ecological Forecasting
- Introduction to the use of remotely-sensed data for predictors in ecological forecasting
- Overview of example sensors and tools relevant to ecological forecasting
  - MODIS NDVI
  - VIIRS Land Products
  - AppEEARS
- Case study examples

Session 2 (September 14): Overview of climate science and data
- Introduction to gridded historic and projected climate data
- Considerations of appropriate use of climate data in ecological impact assessments
  - Downscaling (statistical vs. dynamical) and bias correction methods
- Review of online resources
  - Online climate tools (e.g. EPA, CRT Climate Toolkit, WWA dashboard)
  - Accessing climate data (e.g. R package)
- Demo: US Climate Resilience Toolkit

Session 3 (September 21): Overview of scenario planning
- Scenario planning as a tool for grappling with the uncertainty of climate change and other factors, and how those affect management objectives
- Selecting a small set of climate futures
- Considering additional, non-climate factors
- Developing scenarios of climate impacts and potential management response
- Case study examples

Session 4 (September 28): Overview of species distribution and state-and-transition simulation modeling
- Introduction to combining ecological response models
- Overview of species distribution modeling
  - SDM as an example ecological response modeling technique
    - Case study examples
  - Explanation of correlative species distribution models
  - Location and predictor data
    - Remote sensing examples

- o Appropriate uses and uncertainty
- o Introduction to VisTrails:SAHM software
- Limitations of correlative approaches (disturbance, dispersal, competition, management)
- Ecological Simulation Modeling
  - o Overview of simulation modeling approaches
  - o State-and-transition conceptual models and simulations
  - o Management-relevant example applications
  - o Introduction to ST-Sim software