RangeView

Geospatial Tools for Natural Resource Management

The University of Arizona

Introduction

Natural resource management in the Western U.S. aimed at long-term, sustainable use of public and requires communication between natural resource agency personnel, ranchers, developers, and other land users. Bridging the knowledge gap between these groups in terms of new tools and technologies is the key to effective communication and management. In response to requests from natural resource managers for value-added, easy-to-use, and spatially explicit products derived from remote sensing data, the University of Arizona has created RangeView.

Home page of the RangeView web site

RangeView is a web-based information system that allows users to view, animate, and analyze satellite imagery in order to monitor vegetation dynamics through time and across landscapes. RangeView is designed for use in natural resource decision-making in ways that complement traditional rangeland management procedures, such as field-based inventory and ground monitoring techniques.

The RangeView application is the result of a collaborative, on-going knowledge exchange between stakeholders (natural resource managers from government agencies, ranchers, resource conservationists, wildfire managers and information officers, educators, etc.) and the research and development team at the University of Arizona. This two-way exchange provides continual assessment of user requirements while simultaneously educating those users on how to make use of the application and interpret the data and value-added products that it makes accessible. Throughout the year, RangeView holds numerous presentations, workshops and training sessions in order to identify lead users, introduce intermediate products, and instruct end users on how these innovations can be used as a decision aid to enhance their current management practices.

Application

The images and data provided by the RangeView website are a unique resource to initiate dialogue between natural resource decision-makers. The following demonstrates how RangeView could serve as an additional objective source of information on land cover conditions available for use by private, state and federal land-use managers.

Persistent drought in the western U.S. has often necessitated reductions or destocking of livestock or modification of wildlife management practices due to deteriorating vegetation conditions. Ultimately, these decisions have a significant economic impact on livestock owners or on habitat management. For example, herd liquidation results in loss of cattle genetically adapted to the specific environment, greatly impacting the replacement of the herds in the future.

Given the large areas covered by grazing allotments and the extreme spatial variability of rainfall in the western states, forage condition is often difficult to establish for every pasture throughout the growing season. Using RangeView to visualize vegetation trends across an allotment or a wildlife management unit, a natural resource manager views an area assumed to be in poor condition due to regional drought, while visual evidence reveals localized summer rains produced a substantial amount of perennial grasses. After sharing this information with others responsible for managing the area, it becomes evident that a closer inspection of the area is warranted (i.e. review of ground based monitoring data), and it is carried out.

Due to the limited number of rain gauges in the area it is impossible for the natural resource manager to demonstrate to all groups involved in the management of these lands that drought conditions do not also prevail at this site. However, a proxy for the impact of rainfall is available through the RangeView website in the form of the satellite measured vegetation greenness. Responsible natural resource managers then jointly evaluate vegetation condition through the tools on the RangeView website. Using the dynamic zooming capability and multiple reference layers, the land managers are able to navigate to and zoom-in on the areas under discussion. To estimate vegetation conditions and compare with previous years, the *AVHRR Greenness* images, *difference from previous year* images, and *difference from long-term average* images are selected. These images indicate that present conditions in these pastures are improved over last year and better than the 11-year average. Taking into consideration both the field measurements and the RangeView evidence, managers now have access to a common data source that can be used to reach new management agreements reflecting vegetation trends visualized with RangeView. RangeView can enhance the management process and directly contribute to the conservation and sustainable use of these resources.

http://rangeview.arizona.edu

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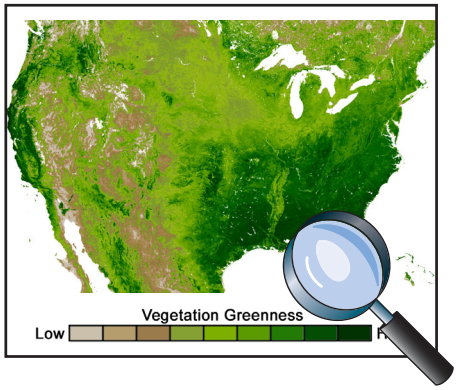
With RangeView you can . . .

Add Map Features

Overlay map features onto the satellite images, such as roads, cities, county boundaries, and contour lines.

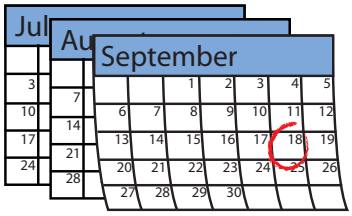
Zoom In

Use the overlaid map features to locate your area of interest and then zoom in for a more detailed view of the image.



Select a Time Period

Select a time frame for which to view the satellie images. Current images are updated regularly, and some sets of imagery are available from 1989 to present.

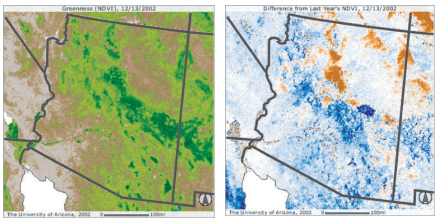


Choose a Data Set

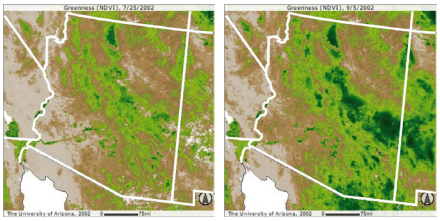
Select imagery from several satellite sensors based on your individual preferences, image resolution, range of historical data, and number of vegetation measurements.

Compare Images

View several map windows at once to compare vegetation greenness at different times or with different vegetation greenness measurements. Assess vegetation greenness relative to an average greenness for the past decade or relative to a previous time period.

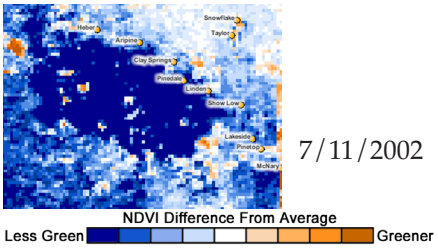


Two images of Arizona from the same date. On the left, a vegetation greenness image; on the right, difference from previous year's greenness.



Two images from different dates show the green-up following Monsoon rains.

Monitor Wildfire

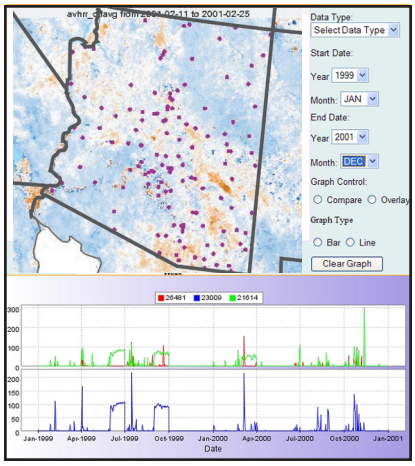


7/11/2002

The Rodeo-Chediski wildfire in June 2002 was the largest in Arizona history and burned a total of 186,373 ha of mostly forest land. The fire perimeter is visible in this difference from average greenness image, which indicates that the burned area is significantly less green than it was the previous year.

Graph Rainfall

Select rain gauges in your area of interest, and see a graph of precipitation alongside the images for the time period selected.



Graph Greenness

Select a small area on the image and see a graph of the values of vegetation greenness in that area for the time period selected.

Animate!

RangeView will generate an animation of the customized images based on the time period selected. Browse through the images one at a time or view them continuously.

GeoDIVA — Geographic Data & Information Visualization & Analysis

Arizona Remote Sensing Center

The University of Arizona Cooperative Extension
College of Agriculture and Life Sciences

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