



# RANGEVIEW



Raytheon  
Synergy III

Geospatial Tools for Natural Resource Management @ THE UNIVERSITY OF ARIZONA.

RangeView "Geospatial Tools for Natural Resource Management" was developed by components of the University of Arizona's College of Agriculture and Life Sciences. It is one *Infomart* for rangeland natural resource managers and decision makers. The Infomart includes interactive tools that provide assistance in understanding vegetation dynamics across large areas and over time. These tools incorporate satellite imagery and digital maps in ways that complement traditional rangeland management tools such as field-based inventory and monitoring techniques (e.g. the Parker 3-Step). The Infomart offers documentation and a tutorial to aid new users in their efforts to interpret geospatial information and understand the underlying technology. It also reports the status of research on cattle-wildlife-forage interactions that is based on the spatial and temporal analysis of vegetation dynamics.



- [About the Project](#)
- [Which tool should I use?](#)
- [Correlation of Monitoring and Satellite Data](#)
- [Presentations and Activities](#)
- [Site Glossary](#)
- [Links](#)
- [Site Map](#)

*last updated*  
01/30/02

Questions and comments



Source of Rangeland Information



Source of Remote Sensing data

 Introduction/  
Overview

 Tools &  
Animations

 Analysis &  
Reports

Within the larger Synergy initiative, prototype Infomarts are being implemented to demonstrate how Earth Observing System (EOS) satellite imagery and other commercial data can be used to address real-world problems confronting users, particularly in state, local and tribal government agencies. The EOS Data and Information System (EOSDIS) Synergy project is intended to enhance the efforts of NASA and university researchers around the United States who are investigating potential applications of remote sensing data. NASA sponsors these efforts under a contract with Raytheon, the prime contractor for the development of the EOSDIS Core System.

<http://rangeview.arizona.edu>

Range condition in the western U.S. affects the viability of the intertwined interests of wildlife and natural resource management, cattle production, and preservation of existing natural resources. Our RangeView project concentrates on the design and delivery of information products that allow for the assessment and visualization of current and past vegetation conditions through time.

RangeView includes: (1) new remote sensing web-based tools to characterize vegetation and landscape dynamics using Normalized Difference Vegetation Index (NDVI) time-series animations of current/past conditions and greenness differences integrated with climate measures, which are coupled with an interactive map server for data integration and analysis; (2) web-based and integrated range-resource information products through the RangeView website and the Arizona AgNIC Managing Rangelands website; (3) enhanced access to a wide-range of original remote sensing images and digital maps through the Arizona Regional Image Archive (ARIA) website; (4) direct connectivity to the Geospatial Extension Specialist program and cooperative extension agents involved in the use of geospatial data throughout the west; and (5) web-based information products concerning wildlife, cattle, and range resources.

Objectives of the project are:

1. Development of new remote sensing products, additional data sets, and services for the natural resource management community.
2. Design and development of the new RangeView website and associated tools through direct interaction with the user community.
3. Development of new links to information products.
4. Identification of combinations of satellite-derived greenness measures and ground-based vegetation data that will be most useful to range managers.
5. Development of new tools for wildlife management and forage assessment.
6. Development of a plan for sustainability – develop a professional assessment of the market for the tools we are developing for natural resource managers and how these tools should be improved and made sustainable.

This booklet is designed to assist you in understanding how to use the current web-based tools at the RangeView website.

# RangeView Geospatial Tools

## Demonstrations and Examples of their Use for Rangeland Management

**RANGEVIEW** NASA

Geospatial Tools for Natural Resource Management @ The University of Arizona

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AgRIIC  
Partners  
Source of Rangeland Information

**A-R-I-A**  
Source of Remote Sensing data

<http://rangeview.arizona.edu/tools/>

# How to Use the Animations

Choose Animation Parameters	
1. Region	<input checked="" type="radio"/> Arizona <input type="radio"/> Southwest <input type="radio"/> U.S.
2. Year	2000
3. Display Interval	2000 milliseconds
<input type="button" value="Create movie"/>	
Please be patient while images load	

Choose the region of interest

Choose the time period of interest

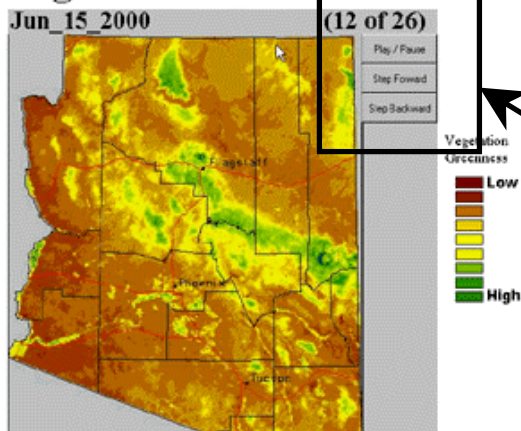
Choose how long you want each image to display

Start the movie

[Suggested Demos](#)

Gives you a region & time interval to try for demonstration purposes

## Vegetation Greenness



Play / Pause

Pause or Play the Movie

Step Forward

Moves to the next image

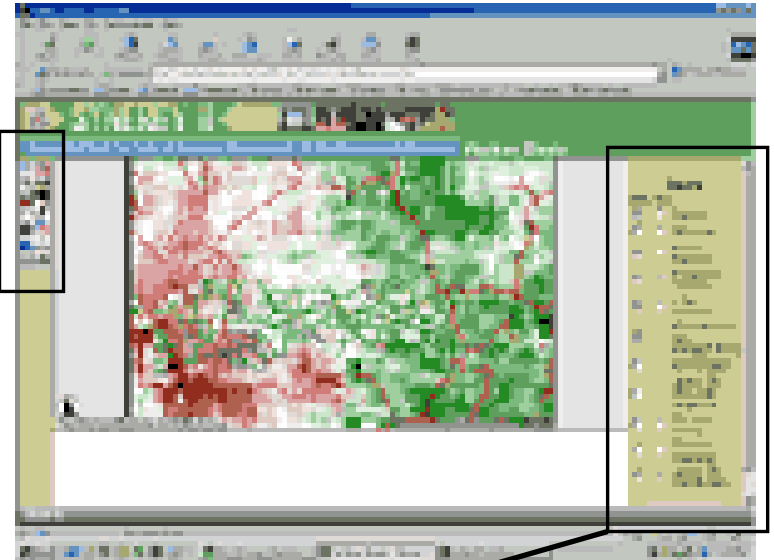
Step Backward

Moves to the previous image

# How to Use the Map Server














**These are the different tools you can use to interact with the data layers. A detailed description of each one is on the next page.**



**This is where you choose the layers you want to see. “Visible” means that you can see it. “Active” means that you can query it for its data. You may only have 1 active layer at a time, but multiple visible layers.**

# Map Server Tools

	This tool will <i>toggle</i> between the layer names and the legend for the layers.
	This tool allows you to <i>zoom in</i> by drawing a box around an area of interest or simply clicking on an area. The red box around it means that it is the “active” tool.
	This tool allows you to <i>zoom out</i> by drawing a box around an area of interest or simply clicking on an area.
	This tool <i>zooms to the extent of all of the layers</i> . If your largest layer is the state of Arizona, it will take you to that extent.
	This tool <i>zooms to the extent of the active layer</i> .
	This tool returns you to your <i>previous extent</i> .
	This tool allows you to <i>pan</i> around the image without changing your view extent.
	This tool provides a <i>hyperlink</i> to data associated with the active layer, if it is there.
	This tool allows you to <i>identify</i> a feature, e.g. call up the name of a pasture.
	This tool allows you to <i>query</i> the active layer, e.g. ask it to show you all of the pastures over a certain area.
	This tool allows you to <i>find</i> a specific string in the active layer’s database. It is case-sensitive and will find partial strings; e.g. it will find the pasture named “Herman” if you type in “Her” but not if you type “her”.

# Map Server Tools



This tool allows you to *measure* the distance between two points.



This tool allows you to set the *units* you wish to see distances and areas measured in.



This tool allows you to *print* the current view.

# Vegetation Greenness Time Series Animation Tools – Example

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- Click on the link for the “Vegetation Greenness Time Series Tools”
- Open the “Current Year Only” tool
- Choose the United States as the region and the year as 2002
- Remember that this tool is simply showing you the relative vegetation greenness for each 1 km square of land
- Examine the animations, pausing them and moving through at your leisure. Try to answer the following questions based on your knowledge of vegetation greenness:
  - What are the white/gray areas in northern Utah and Michigan/Wisconsin?
  - Why is the area around the Great Lakes and northern Utah/Nevada so red/brown during January and February?
  - Can you find some places that normally have snow but didn’t seem to get much this year?

# Vegetation Greenness: Difference from Normal Animation Tools - Example

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- Click on the “Vegetation Greenness: Difference from Normal” link
- Open the “Compare two years between 1989-2001” tool
- Choose 1989 for year 1 and 1998 for year 2 with V bar V as the region
- Remember that this tool will be showing you the vegetation greenness *as it differs from the 10-year average*
- Examine the animations, pausing them and moving through at your leisure. Try to answer the following questions based on your knowledge of vegetation greenness:
  - For the February 13, 1998 image, why is the eastern portion so much redder than 1989? (Note that 1989 is a La Niña year and 1998 is an El Niño year)
    - You can view the seasonal categorization of the climate into ENSO types at: [http://www.cpc.noaa.gov/products/analysis\\_monitoring/ensostuff/ensoyears.html](http://www.cpc.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.html)
- Go back and choose 1996 as year 1, leaving all else the same
  - Pretend that this is June 5, 1998 and you vaguely remember 1996 as being a dry summer/fall for the vegetation. You are afraid that this year is shaping up the same way so you pull up these two years for a comparison. After looking up to the June 5, 1998 image (because the future ones don’t really exist), would you still say that this summer/fall is shaping up to be as dry as 1996?
    - Now you can cheat & look into the future.

# Vegetation Greenness: Difference in Time Animation Tools - Example

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- Click on the “Vegetation Greenness: Difference in Time” link
- Open the “Difference from Previous Week” tool
- Choose 2001 as the year and Arizona as the region
- Remember that this tool is showing you the vegetation greenness *as it differs from the previous week*
- Examine the animations, pausing them and moving through at your leisure. Try to answer the following questions based on your knowledge of vegetation greenness:
  - Look at the February 7 image. Based on the sudden appearance of the dark red pixels (as compared to the January 30 image), what would you say happened during the week?
    - And why is the next image, February 15, so much greener all of a sudden?
  - Why is the June 14 image almost all white?

# V bar V Map Server - Example

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- Start the V bar V map server
- Make sure your visible layers include: “V bar V Pastures”, “Difference from Average Greenness (7-26-01)”
- Find the V bar V pasture named “Big Hill”
  - Why is it mostly white?
- Find the pasture named “Horse Knoll”
  - What might you infer about the reddish-colored pixels, knowing that the image is from July 26, 2001?
  - What about the green ones?
- If you have decided to use the best pasture grazing system, and your cattle have been in the “Cedar Flats F” pasture, where would you want to move them next? Why?
- Turn off the “NDVI Difference from Average (7-26-01)” layer and turn on the “NDVI (7/26/01) layer. (*Note: This is now just the raw NDVI values*)
  - If you had just looked at this image instead of the previous one, would you have picked the same pastures to move your cattle to? Why are some of the yellow pixels (relatively dry) in this image so green in the other image?



**We would very much appreciate your reaction, comments and suggestions concerning the web site tools as you explore their functionality. We would also be very interested in learning how you would utilize some of these tools in your activities.**

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