

**Landsat-related Resources**  
**Land Use/Land Cover Change on NASA's**  
**Earth Observatory Web Site**  
<http://www.earthobservatory.nasa.gov>

**IMAGES**

**Images with Captions: Visible Earth**

<http://visibleearth.nasa.gov/>  
Searchable collection

**Image of the Day**

See on Earth Observatory home page. Hotlink to archive.

**Science Visualization Studio**

<http://svs.gsfc.nasa.gov/>

**DATASETS**

<http://earthobservatory.nasa.gov/Observatory/datasets.html>

See especially: Biosphere, Chlorophyll, Vegetation, Rainfall, Landcover classification, and Population.

See also *Earth Observatory's Natural Hazards section*. Use link from EO homepage.

**ARTICLES**

**The Carbon Cycle**

<http://earthobservatory.nasa.gov/Library/CarbonCycle/>

Biological/Physical Carbon Cycle: Photosynthesis and Respiration; Carbon on the Land and in the Oceans: The modern carbon cycle; The Human Role; NASA Missions to Study the Global Carbon Cycle and Climate; References

**Conservation: New Tools for Conservation**

<http://earthobservatory.nasa.gov/Study/Conservation/>

With remote sensing data, conservation scientists are able to accurately map species' habitats and plan conservation programs.

**Coral Islands: Amazing Atolls of the Maldives: Exploring How Wind and Waves Shape Coral Islands**

<http://earthobservatory.nasa.gov/Study/Maldives/>

**Coral Reefs: Mapping the Decline of Coral Reefs**

<http://earthobservatory.nasa.gov/Study/Coral/coral.html>

Scientists at NASA's Goddard Space Flight Center and at several universities around the world have been able to map coral reefs in a fraction of the time it takes to map them by boat or airplane.

## **Amazing Atolls of the Maldives: Exploring How Wind and Waves Shape Coral Islands**

<http://earthobservatory.nasa.gov/Study/Maldives/>

## **Deforestation: Yellowstone Park Boundary from Landsat 7**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=2514](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=2514)

The boundary between Yellowstone National Park and Targhee National Forest...>The forest to the left of the boundary is dominated by numerous clearcuts.

## **Disease: Hantavirus Risk Maps**

<http://earthobservatory.nasa.gov/Study/Hanta/>

Disease researchers are using Landsat data to help pinpoint likely areas where hantavirus may break out.

## **Disease: Mapping Malaria**

<http://earthobservatory.nasa.gov/Study/Malaria/>

A group of scientists at the Uniformed Services University and NASA have been working on a system to pinpoint areas at high risk for malaria. By predicting this risk, they can dramatically reduce the environmental damage and the cost of with dealing with the disease.

## **Earth Observing – 1**

<http://earthobservatory.nasa.gov/Library/EO1/eo1.html>

NASA's New Millennium Program (NMP), an advanced-technology development program created to infuse a new generation of technologies and mission concepts into future Earth and space science missions.

## **Farming: Just Add Water**

<http://earthobservatory.nasa.gov/Study/HarranPlains/>

A major infrastructure is under development in Turkey's Southeast Anatolia region that will provide irrigation to 1.7 million hectares (4.2 million acres) of new farmland.

## **Farming: Precision Farming**

<http://earthobservatory.nasa.gov/Study/PrecisionFarming/>

A new generation of farmers is using aerial and satellite remote sensing imagery (like this 4-meter resolution) to help them more efficiently manage their croplands.

## **Fire: Global Fire Monitoring**

<http://earthobservatory.nasa.gov/Library/GlobalFire/>

Why are Fires Important? Trace Gas Emissions; Aerosol Emissions; NASA and NOAA Missions for Monitoring Global Fires

## **Fire: From Forest to Field. How Fire is Transforming the Amazon**

[http://earthobservatory.nasa.gov/Study/AmazonFire/amazon\\_fire.html](http://earthobservatory.nasa.gov/Study/AmazonFire/amazon_fire.html)

**Fire: Evolving in the Presence of Fire**

<http://earthobservatory.nasa.gov/Study/BOREASFire/>

Many people regard fire as a destructive force that should be fought and quickly extinguished, yet fact the boreal forest evolved in the presence of fire and adapted to it. From 1993-97, teams of scientists from all over the world participated in the NASA-sponsored Boreal Ecosystem-Atmosphere Study (BOREAS) to examine the physical and chemical interactions that occur between the boreal forest and the lower atmosphere.

**Fire: Satellites Aid Burned Area Rehabilitation**

<http://earthobservatory.nasa.gov/Study/BAER/baer.html>

Teams of interdisciplinary experts from several federal and state agencies make up a Burned Area Emergency Rehabilitation Team, whose mandate is to assess the ecological effects of fire within seven days of containment. Over the past decade, scientists at the USDA Forest Service's Remote Sensing Applications Center (RSAC) in northern Utah have been developing techniques for using airborne and satellite-based instruments to map out burned landscapes in the aid of recovery.

**Fire: Los Alamos Fires from Landsat 7 (2000)**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=3119](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=3119)

Two band combinations showing same area: True color + Infrared: Penetrate the smoke plume and see the structure of the fire on the surface. High level of detail...burn scars are clearly distinguished from the hotter smoldering and flaming parts of the fire.

**Floods: Using Satellites to Keep Our Heads Above Water**

<http://earthobservatory.nasa.gov/Study/Floods/>

Millions of people in the United States and around the world have no idea that they live on a floodplain.... Orbiting imaging satellites help scientists create floodplain maps, which they then catalog on a database for everyone to use.

**Flooding in Mozambique**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=152](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=152)

A month of rains and two cyclones caused the Limpopo River to swell to 80km wide in places.

**Fossils: Finding Dinosaur Fossils from Space**

<http://earthobservatory.nasa.gov/Study/Fossils/>

In an effort to improve their chances at finding fossils in a vast desert, museum researchers have found a way to locate potential fossil beds with satellites before even setting foot there.

### **Global Warming: Monitoring Glaciers to Watch Global Warming**

<http://earthobservatory.nasa.gov/Study/Glaciers/>

Researchers obtain a measure of average global temperatures by using satellites to monitor heat-sensitive objects on the ground. Of these objects, glaciers are among the most reliable indicators of climate change.

### **Hurricanes' Effects: Sedimentation Effects from a North Carolina Hurricane: Floyd's Lasting Legacy**

[http://earthobservatory.nasa.gov/Study/FloydSediment/sediment\\_3.html](http://earthobservatory.nasa.gov/Study/FloydSediment/sediment_3.html)

Landsat shows sediment transport in surface water before and after violent storms, Researchers find that, "...floods often happen in ways we haven't thought of."

### **Land Cover Classification**

<http://earthobservatory.nasa.gov/Library/LandCover/>

Mapping Earth's Diverse Landscapes; Differentiating Between Land Cover Types; The Basic Vegetation Map; The Problems in Uncovering Land Cover

### **Land Cover: Landsat 7 Landcover Maps to Benefit Chesapeake Bay Watershed**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=3329](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=3329)

### **Land Surface and Climate:**

#### **Changing Global Land Surface**

<http://earthobservatory.nasa.gov/Library/LandSurface/>

NASA's Landsat-7 and Terra satellites make new data available that can help us better understand and predict how Earth's changing land surfaces affected climate, as well as how climate changes will further cause land surfaces to change.

### **Land Use: Yellowstone Park Boundary from Landsat 7**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=2514](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=2514)

See the difference between park and not-park with Landsat 7.

### **Landsat 7 Fact Sheet: About Landsat 7**

<http://earthobservatory.nasa.gov/Library/Landsat/>

The latest mission in the Landsat series - Landsat 7 - continues the flow of global change information to users worldwide. The Landsat 7 system offers the unique ability to seasonally monitor important small-scale processes on a global scale.

### **Landsat's 30<sup>th</sup> Anniversary: Celebrating 30 Years of Imaging the Earth**

<http://earthobservatory.nasa.gov/Newsroom/NasaNews/2002/2002072210307.html>

July 23, 2002: NASA and the U.S. Geological Survey this week celebrate Landsat's 30th anniversary of imaging the Earth.

### **Landslides: When Land Slides**

<http://earthobservatory.nasa.gov/Study/Landslide/>

Scientists increasingly rely on global satellite data to help assess the risk for potential landslides. They can merge Landsat data with "synthetic aperture radar" (SARTM) to produce a third image with topographic details essential to producing high-quality landslide maps.

### **Remote Sensing**

<http://earthobservatory.nasa.gov/Library/RemoteSensing/remote.html>

Introduction and History; Radiation; Electromagnetic Spectrum; Absorption Bands and Atmospheric Windows; Spectral Signatures; Pixels and Bits; Color Images; Remote Sensing Methods; NASA Remote Sensing; Accomplishments

### **Spotting the Spotted Owl**

<http://earthobservatory.nasa.gov/Study/SpottedOwls/>

With the help of Landsat 5 and Landsat 7, researchers plan to locate areas where spotted owls are likely to live, and to map out the owl's habitat and create a method for assessing the health of the owl population in the Pacific Northwest.

### **Urbanization: Article in Three Parts**

#### **(1) Bright Lights, Big City**

<http://earthobservatory.nasa.gov/Study/Lights/>

#### **(2) Reaping What We Sow**

<http://earthobservatory.nasa.gov/Study/Lights2/>

#### **(3) Urbanization's Aftermath**

[http://earthobservatory.nasa.gov/Study/Lights3/lights\\_carbon.html](http://earthobservatory.nasa.gov/Study/Lights3/lights_carbon.html)

### **Volcanoes: Tracking a Volcano: Satellite Observations of Piton de la Fournaise, Reunion Island**

<http://earthobservatory.nasa.gov/Study/ReunionIsland/>

NASA satellite data provided a unique perspective on the volcano and its eruption while it occurred in January 2002.

### **Volcanoes in Patagonia**

[http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=3924](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=3924)

This view of northern Patagonia, at Los Menucos, Argentina shows remnants of relatively young volcanoes built upon an eroded plain of much older and contorted volcanic, granitic, and sedimentary rocks.

## **Water Quality: Testing the Waters: Using Satellites to Monitor Water Quality**

[http://earthobservatory.nasa.gov/Study/WaterQuality/water\\_quality.html](http://earthobservatory.nasa.gov/Study/WaterQuality/water_quality.html)

Using imagery from Landsat satellites, the scientists have mapped the water clarity for over 10,000 of Minnesota's lakes at a relatively low cost. In the future, the scientists in Minnesota will combine their map with similar maps being created at the University of Wisconsin and Michigan State University to create a comprehensive water quality map for the entire Upper Great Lakes region.

## **Special Section: A NASA Earth Science Guide to the Biosphere**

<http://earthobservatory.nasa.gov/odysseyofthemind/Biosphere/>

### **Mission Biomes @ NASA's Earth Observatory**

Have you ever wondered what it would be like to live in a different part of the world? What would the weather be like? What kinds of animals would you see? Which plants live there? By investigating these questions, you are learning about biomes. *For Grades: 3-8*

Understanding the Biosphere from the Top Down: Earth Science Teacher's Guide for Grades 4-12 @ NASA's Ames Research Center *For Grades: 4-12*

### **Changing Global Land Surface @ NASA's Earth Observatory**

Human presence across the face of the Earth is substantial and growing. Increasingly, from the perspective of outer space we can see the "fingerprints" of human presence on our landscapes. *For Grades: 9-12*

### **Phytoplankton @ NASA's Earth Observatory**

Phytoplankton are microscopic plants that live in the ocean. There are many species of phytoplankton, each of which has a characteristic shape. Collectively, phytoplankton grow abundantly in oceans around the world and are the foundation of the marine food chain. *For Grades: 9-12*

### **Tropical Deforestation @ NASA's Earth Observatory**

The clearing of tropical forests across the Earth has been occurring on a large-scale basis for many centuries. This process, known as deforestation, involves the cutting down, burning, and damaging of forests.

*For Grades: 9-12*

### **Drought @ NASA's Earth Observatory**

While much of the weather that we experience is brief and short-lived, drought is a more gradual phenomenon, slowly taking hold of an area and tightening its grip with time. In severe cases, drought can last for many years, and can have devastating effects on agriculture and water supplies. *For Grades: 9-12*

**Contacts for Landsat 7 Education and Outreach  
NASA Goddard Space Flight Center:**

Anita Davis

Lead/Education and Outreach for NASA's Landsat Program  
Science Systems and Applications, Inc.  
Code 614, Building 33  
NASA Goddard Space Flight Center  
Greenbelt, MD 20771  
E-mail: [adavis@pop900.gsfc.nasa.gov](mailto:adavis@pop900.gsfc.nasa.gov)  
Ph: 301-614-6669

Jeannie Allen

Sr. Science Education Specialist  
Science Systems and Applications, Inc.  
Code 614, Building 33  
NASA Goddard Space Flight Center  
Greenbelt, MD 20771  
E-mail: [jeallen@pop900.gsfc.nasa.gov](mailto:jeallen@pop900.gsfc.nasa.gov)  
Ph: 301-614-6627