



## INSIDE THIS ISSUE

- |   |                                      |
|---|--------------------------------------|
| 1 | Landsat and the Chesapeake Bay       |
| 3 | Sustainability and Recycling at GSFC |
| 4 | HMMS and Universal Wastes            |

Visit us on the web for more information about Goddard's environmental programs and other outreach bulletins at

<http://code250.gsfc.nasa.gov/outreach.cfm>

## Landsat and the Chesapeake Bay

By Gina Robrs and Rebecca Ford  
Code 250

### How Landsat Fits into the Big Picture of the Bay

Did you know that the Chesapeake Bay is not only the largest estuary in the United States, but also one of the most productive estuaries in the world? It is home to 3,700 species and spans the largest land area to water volume ratio of any other estuary in the U.S. The activities that take place within its watershed greatly affect the condition of the Bay and the wildlife it supports.

Currently, the Chesapeake Bay and an estimated 90 percent of its tributaries are impaired as a result of excess nutrients and sediments. These excess nutrients cause poor water clarity, algal blooms, and "dead zones," where there is too little oxygen for fish, oysters, and crabs to survive. The root cause of nutrient pollution comes back to us: people. The population within the Chesapeake Bay watershed has more than doubled since 1950. More people mean more pavement, sewage, fertilizers, and nutrients, with fewer natural filters to absorb them. The increase



Figure 1. Landsat image of the Chesapeake Bay watershed.

in impervious surfaces causes an increase of harmful stormwater run-off into our waterways.



Figure 2. Landsat image of sediment in the Susquehanna River after

### Stormwater Impacts on the Chesapeake Bay

Rain water carries a number of contaminants at high velocities off of roads, rooftops, and parking lots, across impervious surfaces, and directly into our waterways. This stormwater not only pollutes waterways, but also has the potential to scour stream banks, destabilize stream contours, and further muddy the

water. Though stormwater management controls have been required by the Clean Water Act since the 1990s, much of the development that took place prior to the legislation had no stormwater controls in place. According to the U.S. Environmental Protection Agency (EPA), stormwater is the source of about 16 percent of the total nitrogen entering the Bay and that number is increasing. Taking a step back to look at the watershed from a bird's-eye view, however, has helped us see how development has affected the Chesapeake Bay and where stormwater management practices are needed.



## *Landsat Imagery through the Years...*

Landsat satellites have been continuously and consistently archiving images of the Earth's landscape since the early 1970's. From over 400 miles above the Earth's surface, these satellites capture images with incredible detail and coverage. The Landsat sensors have a moderate spatial-resolution, which is coarse enough to gather images on a global scale, yet are capable of characterizing human-scale processes such as urban growth and changes in land use. Land cover data are especially valuable when predicting the most effective methods of lessening stormwater pollution within the Chesapeake Bay watershed.

## *What does Landsat Tell Us about the Bay?*

Landsat has captured images for the entire 64,000 square miles of the Chesapeake Bay watershed over the past few decades, and has provided us with a baseline of how human activities have affected the wildlife habitat, air, and water quality. This baseline information has enabled us to monitor changes in impervious surfaces, tree canopy, and ground cover over time, in order to predict future trends in land use.

Landsat data allows users to create models based on the watershed's landscape to predict where nutrient and sediment loads are likely to occur and where stormwater quality improvements would be most effective. Land use maps have also been derived from Landsat data and are used by the Chesapeake Bay Program to help managers geographically identify and target areas for conservation, restoration, and growth. Better planning for "green" infrastructure opportunities helps states and municipalities develop smarter strategies for reducing pollution and protecting the Bay. ❖

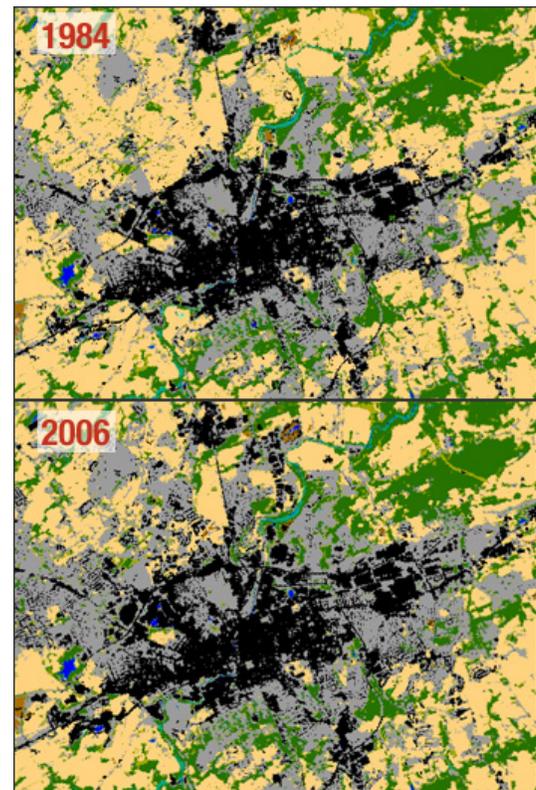


Figure 3. Land cover data collected from Landsat satellites for the York, PA region in 1984 and 2006. Black represents medium to high-intensity urban areas, grey represents low-intensity urban areas, and green represents tree canopy.

*Visit the websites below for more information on how Landsat data help improve stormwater management within the Chesapeake Bay watershed.*

[http://landsat.gsfc.nasa.gov/news/news-archive/soc\\_0024.html](http://landsat.gsfc.nasa.gov/news/news-archive/soc_0024.html)

[http://landsat.gsfc.nasa.gov/news/news-archive/soc\\_0017.html](http://landsat.gsfc.nasa.gov/news/news-archive/soc_0017.html)

[http://landsat.gsfc.nasa.gov/news/news-archive/soc\\_0035.html](http://landsat.gsfc.nasa.gov/news/news-archive/soc_0035.html)



## Recycling

### Sustainability at GSFC: We Need Your Help!

By Darlene Squibb and Joel Donham

Code 250

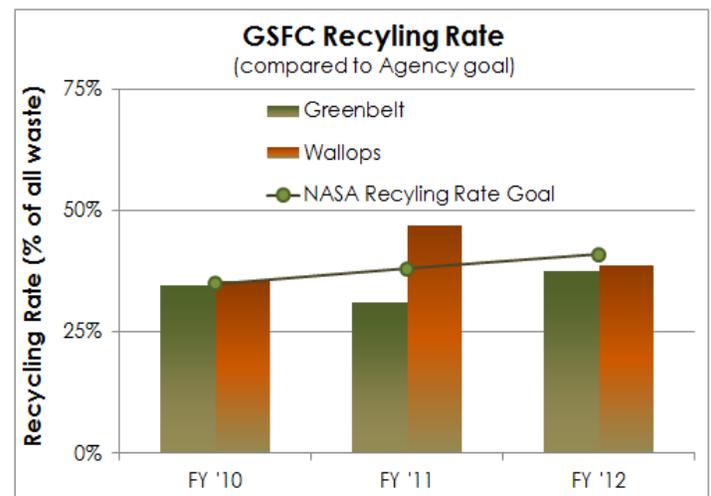
In the spring the Earth comes back to life as plants emerge and flowers bloom. The change in seasons reminds us that there is no such thing as waste in nature. What dies off in the fall and winter transforms and is reused by plants and animals in the next season. Humans can learn a lot from the natural world about reducing waste and recycling what we produce. When you recycle an item, you keep it out of a landfill and allow it to be turned into a new product. Making products from recycled materials conserves energy and natural resources and lessens our impact on the natural world.

NASA has a strong drive to ensure sustainable operations. As one of the largest Earth science research organizations in the world, NASA has an imperative not to affect the future of the planet in the course of doing research on it. NASA is addressing its impact on the environment through its [sustainability program](#). The sustainability program consists of numerous goals ranging from greenhouse gas (GHG) emissions reductions to purchasing products with lower life-cycle impacts on the environment.

Many of these goals are addressed through facilities management, acquisition policies, and operations programs. Some, however, can only be addressed through collective action by all NASA employees. The best example of such an impact area is recycling. GSFC implemented an aggressive single-stream recycling program in September 2011 at Greenbelt and Wallops. The program streamlines recycling for employees by allowing them to commingle glass, aluminum, plastic, white paper, and mixed paper in one bin. Now employees only have to sort two waste streams: trash and recycling.

In spite of the simplified process of single-stream recycling, rates have not improved much at Goddard. NASA needs your help to meet its goal of recycling 50% of office waste. If you don't know where your recycling bins are, talk to your [FOM](#).

Code 250 is exploring ways to provide more fine-grained data on recycling performance to give NASA employees the tools they need to understand the impacts of their recycling behavior.



If you have any questions or can help us identify any large scale recycling opportunities in your lab, shop or workspace, let us know. Remember: make recycling part of your daily activities! For more on recycling at work and tips for home, visit: <http://recycle.gsfc.nasa.gov>.

**Recycling Tip!**

For convenience, consider reusing a shipping box to collect recyclable materials at your workstation and make periodic runs to the recycling bin instead of throwing them in the trash.



# Environmental Management

National Aeronautics and Space Administration



April 2013 Newsletter

## HMMS is Here

### The Yellow Sticker Gets Picked up Quicker!

By Ken Yargus  
Code 250

Goddard's Hazardous Materials Management System (HMMS) makes purchasing hazardous materials and managing the wastes easier. So far, the HMMS Team has inventoried 30,000 hazardous materials containers and collected 11,500 empty containers.



Remember: Turn In Yellow Stickers! Turning them in gives us accurate inventories for emergency responders and data for required regulatory reports. Use [EMOD](#) to request pickup.

Find all Safety Data Sheets (SDS) at <https://gs279hmmsias.gsfc.nasa.gov/pls/msds>

Call 6-HMMS (6-4667) with any questions.

Turn in empty HM containers that have yellow inventory stickers so we can remove them from the inventory.

### The Yellow Sticker Gets Picked Up Quicker



### Universal Wastes (are not from outer space)

Universal wastes are certain widely-generated hazardous wastes that are subject to less stringent regulations that streamline collection and management requirements to facilitate environmentally sound collection and proper recycling or treatment. Universal wastes include batteries (alkaline batteries are NOT recycled at GSFC), pesticides, and mercury-containing equipment (e.g., thermostats) and lamps (e.g., fluorescent bulbs).

GSFC disposes of NiCad, Lithium, Nickel Metal Hydride, and Lithium Ion batteries. There is an expenditure of government resources for disposal; therefore, **only** work-related batteries may be disposed of at GSFC. For personal batteries and other household universal wastes, check with your county of residence for disposal options.

Here a few resources for waste disposal in Maryland to get you started:

- [Maryland county contacts for questions](#)
- [Montgomery County](#)
- [Prince George's County](#)
- [Howard County](#)
- [Anne Arundel County](#)

The Medical and Environmental Management Division will collect and properly dispose of universal waste. Call us at x6-9233 or e-mail at [gsfc-hazwaste@lists.nasa.gov](mailto:gsfc-hazwaste@lists.nasa.gov).