

REMOTE SENSING EDUCATIONAL OPPORTUNITIES AVAILABLE THROUGH WYOMINGVIEW

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ABSTRACT

WyomingView is one of twenty-seven members of the AmericaView program (www.americaview.org), funded by the USGS (americaview.usgs.gov). One of the goals of WyomingView is to promote remote sensing educational opportunities in Wyoming for its current and future workforce. Since its inception in 2002, WyomingView has worked with federal, state and local government agencies to identify remote sensing training needs. These activities have resulted in the development of several short courses aimed to benefit managers and remote sensing specialists in the Bureau of Land Management, Wyoming Game & Fish, and Wyoming State Engineers Office. These courses are offered in Laramie and other cities in Wyoming through our mobile teaching lab. Currently we are working to develop internet based courses to reduce travel time and cost, and we offer flexibility to agency personnel with our mobile teaching laboratory. Through seminars and other mechanisms, WyomingView has increased the breadth of remote sensing courses offered at the University of Wyoming. WyomingView has provided data, teaching materials and software to faculty members in various academic departments to promote remote sensing research and education.

INTRODUCTION

One of the goals of the WyomingView consortium (<http://www.wygisc.uwo.edu/wyview>) is to promote remote sensing education in Wyoming for its current and future workforce. This paper describes WyomingView educational activities and how they have benefited personnel in government agencies, and students and researchers at the University of Wyoming. WyomingView is one of twenty-seven members in a national consortium called AmericaView (<http://www.americaview.org>) funded by the US Geological Survey (<http://americaview.usgs.gov>). WyomingView, like the other 27 stateview programs, aims to promote remote sensing technology by 1) building a consortium of users from agencies, academic institutions, private companies and NGOs, 2) building a state-wide archive of remotely sensed satellite data and making it available through web-based clearing houses, 3) promoting remote sensing education for both students and professionals, and 4) testing the utility of remotely sensed data for addressing natural resources monitoring and mapping in the state (Driese and Sivanpillai, 2004).

PROMOTING REMOTE SENSING EDUCATION

Current workforce

Through targeted outreach activities we identified the remote sensing needs of several federal and state government agencies in Wyoming (Figure 1). After listening to an overview of remote sensing and its potential for monitoring and mapping natural resources, personnel in these agencies were asked about their specific tasks and their current level of remotely sensed data use. Through such discussions we identified several reasons for the under-use of remotely sensed data and technology. Issues related to data format and suitability, and complexities associated with pre-processing were major hurdles that prevented seamless integration with their work-flows. To overcome these barriers WyomingView developed two short courses aimed at promoting wide-spread use of remotely sensed data.

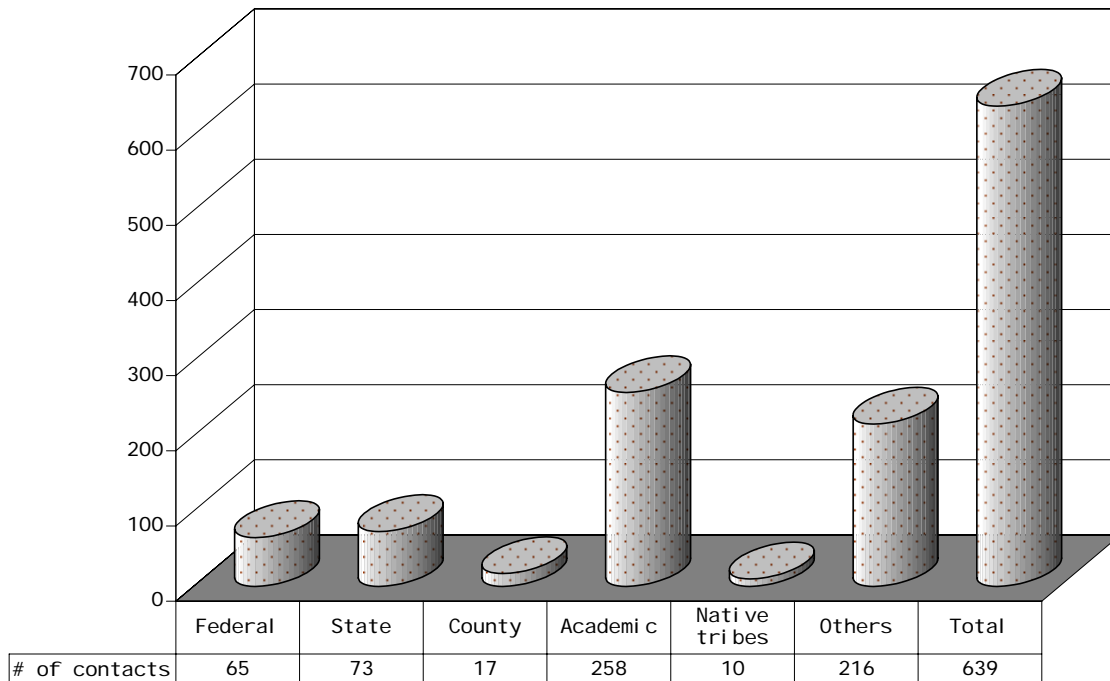


Figure 1. Number of individuals contacted through WyomingView outreach activities.

The first of these short-courses familiarizes managers and technical experts in these agencies with the steps involved in managing a remote sensing project. The primary objective of this course is to introduce the suitability of different types of remotely sensed data for a range of natural resources management applications. For example, the trade-offs associated with acquiring medium-resolution versus high-resolution data for mapping land cover changes or vegetation characteristics are discussed. The second short-course focuses on overcoming technical difficulties associated with learning a complicated image processing software. Through the use of freeware (e.g., ERDAS Viewfinder) specialists in agencies can view remotely sensed data and also perform simple analyses relevant to their day-to-day activities.

WyomingView also maintains a satellite data archive consisting of Landsat, ASTER and MODIS images. These data are available to users in Wyoming (and elsewhere) in ready-to-use format at no- or low-cost. After participating in our outreach or training, federal and state government agency personnel have requested and obtained Landsat images for applications ranging from monitoring to land cover change analysis to assessment of vegetation recovery following prescribed fire treatments (Sivanpillai and Driese, 2007). Our targeted outreach activities combined with the WyView data archive have resulted in numerous remote sensing projects throughout the state. We intend to conduct additional outreach to smaller agencies and user groups and continue to add satellite data to our archive.

At the University of Wyoming, we have used academic seminars to promote WyomingView resources to faculty and researchers. Such seminars are also tailored for the research interests within each academic department and feature remotely sensed images acquired in Wyoming to highlight opportunities for incorporating satellite data in ongoing or new research. We also educate faculty about technical support available through WyomingView to assist them on issues relating to integrating satellite data into GIS. By helping with data integration and image classification we were able to help several faculty members incorporate remotely sensed data into their work. In addition, some faculty members also use these images as a back-drop for illustrating spatial phenomena such as land cover changes or the landforms of Wyoming. Thus images from the WyomingView archive are used as teaching-aids. We will continue to present WyomingView to other academic departments.

Future workforce

Workforce development is an important priority in Wyoming, and WyomingView personnel contribute by involving students in remote sensing at many levels, from research internships to curricular course teaching to advising. These activities are focused on providing students with a solid foundation in remote sensing so that they can use these skills with them to the workplace. The rural nature of Wyoming and its outdoor heritage result in many students who study natural resource or wildlife management and who graduate to jobs in resource management agencies. By exposing them to remote sensing we hope to infuse this technology into their future work.

One set of students benefiting from the WyomingView program are those enrolled in the remote sensing courses taught at UW. Instructors introduce WyomingView resources and encourage the students to use satellite data for their class research projects. For example, several students were able to obtain data pertaining to their geographic or thematic area of interest. The WyomingView data archive includes “wall-to-wall” multitemporal coverage of Wyoming and students can often find the images required to address their research questions. Using these resources, students have assessed the impact of wildfires, land cover changes due to natural and anthropogenic factors, and vegetation characteristics. Several students have incorporated satellite data into their thesis or dissertation research after gaining the experience to process these data.

Another set of students benefiting from the WyomingView program are those who enroll for independent (or directed) studies with guidance and supervision from WyomingView personnel. These students have worked on projects that involve assessing the land cover changes and other topics. WyomingView data have been used extensively, for example, to assess vegetation response to drought, man-made changes due to energy recovery activities, or wildfire. Students used many Landsat images to accomplish their research goals, which would have been unaffordable for them without the free satellite data source offered through WyomingView. Selecting and purchasing these images might not be possible within the time constraints of a semester (14 weeks).

Students have also benefited from the internship opportunities offered through WyomingView. Students work on real world remote sensing applications under the supervision of experts who train them on various steps associated with a remote sensing research project. Since 2003, seven undergraduate and three graduate students have received WyomingView internships. Students gain valuable experience on pre-processing, classifying images and integrating classified images with GIS data. Students are encouraged to present their work in regional meetings and academic seminars.

Currently almost all of WyomingView efforts to train our future workforce in remote sensing is limited to the University of Wyoming (UW), Laramie. Wyoming also has a community college system, with campuses throughout the state, and we plan to shift some of our focus to these institutions in the future. In addition to Wyoming students, WyomingView has provided satellite data to students in more than 12 states in the US and in 2 Canadian provinces for thesis and term research projects (Sivanpillai and Driese 2007). Like UW students, these students have requested multi-temporal satellite data. Students often requested scenes covering Yellowstone National Park, the Powder River Basin and western Wyoming (active energy development areas) to assess wildfire impacts or anthropogenic activities.

CONCLUSION

Using a relatively small financial investment to initiate and maintain the program, WyomingView has stimulated remote sensing research and educational activities in Wyoming. Targeted outreach and training activities have resulted in increases in the use of satellite data in federal and state government agencies. The satellite data archive maintained by WyomingView has complemented its outreach activities and enabled users in government agencies, private companies and academic institutions to obtain and process large volumes of data for little or no cost. Students and researchers at the University of Wyoming and academic institutions throughout the U.S. have benefited from the WyomingView data archive. Internships and other research opportunities provided by WyomingView have resulted in the development of valuable job-skills for undergraduate and graduate students. Programs like WyomingView serve as an excellent example of how U.S. taxpayers' dollars can be used efficiently for education and future workforce training.

WEB RESOURCES

AmericaView Inc. program page – <http://www.americaview.org>
ASTER (NASA) program page – <http://terra.nasa.gov/About/ASTER/index.php>
ASTER (MODIS) program page - <http://edc.usgs.gov/products/satellite/aster.html>
MODIS (NASA) program page – <http://terra.nasa.gov/About/MODIS/index.php>
MODIS (USGS) program page – <http://edc.usgs.gov/products/satellite/modis.html>
USGS – AmericaView program – <http://americaview.usgs.gov>
Wyoming Geographic Info Science Center – <http://www.wygisc.uwyo.edu>
WyomingView program description page – <http://www.wygisc.uwyo.edu/wyview>
WyomingView data description page – <http://www.wygisc.uwyo.edu/wyview/data.html>
WyomingView data ordering interface – <http://www.wygisc.uwyo.edu/wyview/orderform.html>

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