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Return to Current Issue

# Kite Aerial Photography as a Tool for Remote Sensing

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**Abstract:** As humans, we perform remote sensing nearly all the time. This is because we acquire most of our information about our surroundings through the senses of sight and hearing. Whether viewed by the unenhanced eye or a military satellite, remote sensing is observing objects from a distance. With our current technology, remote sensing has become a part of daily activities. A relatively inexpensive and practical method to have a firsthand experience with collecting remotely sensed data is kite aerial photography (KAP). KAP can be used as a geospatial tool to teach youth and adults about remote sensing.

## Introduction

Remote sensing, as defined by Nicholas Short (2005), is the use of instruments or sensors to "capture" the spectral and spatial relations of objects and materials observable at a distance. This is how Earth's surface and atmosphere are observed, measured, and interpreted from orbit. In simpler terms, remote sensing refers to the recording, observing, and perceiving (sensing) of objects or events in distant (remote) places. It allows us to have a bird's eye view of places and features on Earth.

The earliest forms of remote sensing began with the invention of the camera. In the 1840s, cameras were attached to tethered balloons, and aerial photos were taken. Later, cameras were mounted onto pigeons and then airplanes. These were both used for military reconnaissance, but encountered problems when behind enemy lines (Short, 2005). The most common methods of remote sensing are using aircraft- or satellite-based sensors. Familiar examples of remotely sensed data are the weather maps commonly displayed on newscasts showing precipitation and cloud cover around the country (Morgan & Ess, 2003).

As humans, we perform remote sensing all the time. This is because we acquire most of our information about our surroundings through the senses of sight and hearing. These things do not require close contact between the sensing organs and external objects; therefore, we are remote sensing (Foresman, 2002).

# Kite Aerial Photography

A relatively inexpensive and practical method to collect remotely sensed data is by using kite aerial photography (KAP). Aerial photography from a kite is one of the oldest forms of remote sensing. One of the original kite aerial photographs was taken in 1888 by Frenchmen Arthur Batut. He attached a camera to a kite and proceeded to fly it. The innovative picture of the French countryside near Batut's house can still be viewed. The original kite frame is currently on display in a museum in France (Kite Aerial Photography, 2000). Interest in KAP is currently on the rise. This has been attributed to better equipment and photographic quality (Haefner, 2004).

KAP is relatively inexpensive compared to other aerial photography platforms. New uses and ideas for this form of aerial photography are rapidly developing. KAP is a versatile way to gather aerial photographs of an area. (See Figure 1 for an example.) Aerial photography allows us to look at physical and biological aspects of the environment from a different perspective.

**Figure 1.**
View of Oklahoma State University Experiment Station and Sheep Barn Taken Using KAP on August 15, 2008

## Components

The basic components needed to create a kite capable of aerial photography include: a kite(s), line, reel (spool), camera (digital or film), and a cradle or rig capable of holding the camera on the kite line. Kites used for this are usually of the delta or airfoil style. The size of the kite determines what wind speed it should be flown in. Larger kites (5'x5') should be used in light winds, while smaller kites (3'x3') are used in stronger winds. The line should be heavyweight (150#) and able to handle the weight of the camera and kite. The camera should be small and lightweight. The lift capability of a kite can vary greatly and is dependent upon wind velocity. In higher wind speeds, a kite will lift more weight; in lower wind speeds, a kite will not lift as much. Due to this high degree of variability, a lightweight camera is the best option for KAP. With this approach, the photographer will be more successful in flying the camera and shooting aerial photographs.

## Hazards

There are three main risks or hazards in conducting KAP. They include risks to: KAP equipment, property, and people. Rough landings on concrete or water and getting caught in trees or highline wires are the greatest hazards to KAP equipment and operators. Property damage can occur when a kite rig gets caught or crashes into a building. When flying a kite, power lines are a major hazard to people. It is also important for kite flyers to pay attention to their surroundings if walking with the kite. If the kite is being flown in a crowded area, it is best to scout the area first to determine emergency landing sites.

# Practical Applications of KAP

KAP has been used in scientific research because it is an inexpensive, stable platform. It can be used almost anywhere, especially in remote regions, without disrupting the natural environment. Additionally, minimal training is required for users. KAP has been successfully used in research studies to observe and document:

- Forest canopy and cover
- Penguin behavior in Antarctica
- Fossil forest beds in Canada
- Wetland studies
- Archeological and geologic mapping
- Stream channel characteristics (Aber, 2008)

At Oklahoma State University, KAP has been used to teach youth about remote sensing. 4-H members have used KAP to observe:

- Agricultural property
- Cemetery sites
- Crop scouting
- Fairgrounds layout and design

KAP can be used for Extension education beyond 4-H youth development. For the untrained Extension educator, geospatial technologies such as KAP may appear complex and confusing. However, the applications of this technology cut across many disciplines (Milla, Lorenzo, & Brown, 2005). Additional applications for KAP that may be useful to Extension educators include but are not limited to:

- Determining the status of a growing crop
- Defining urban patterns
- Delineating the extent of flooding
- Recognizing rock types
- Pinpointing areas of deforestation
- Identifying agricultural land damage
- Mapping erosion

# Conclusion

The applications of KAP as an educational tool are limited only by the imagination. The Oklahoma 4-H Youth Development program has been using KAP to develop interest in youth and adults in geospatial technologies (Figure 2). More information on KAP and the Oklahoma Geospatial Program can be found on the Oklahoma 4-H Web site <http://oklahoma4h.okstate.edu/scitech/geospatial.htm>.

**Figure 2.**
4-H Members Learning to Use KAP

## References

Aber, J. S. (2008). Professional applications kite aerial photography, Retrieved January 22, 2009, from: http://www.geospectra.net/kite/applic/applic.htm

Foresman, J. (2002) *My community, our earth*. Redlands, CA: ESRI.

Haefner, S. (2004, July/August). The art of kite photography, Photo Techniques, Retrieved January 22, 2009, from: http://scotthaefner.com/publications/phototechniques/

Kite Aerial Photography (2000). A bit of history; Arthur Batut of Labruguiere, Retrieved January 25, 2009, from: http://arch.ced.berkeley.edu/kap/background/history1.html

Milla, K. A., Lorenzo, A., & Brown, C. (2005). GIS, GPS, and remote sensing technologies in Extension Services: Where to start, what to know. Journal of Extension, [On-line] 43(3) Article 3FEA6. Available at: http://www.joe.org/joe/2005june/a6.php

Morgan, M., & Ess, D. (2003). *The precision-farming guide for agriculturists*. Moline, Illinois: John Deere Publishing.

Short, N. M. (2005). The remote sensing tutorial. Retrieved October 10, 2008, from: http://www.fas.org/irp/imint/docs/rst/Front/overview.html

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