

Enhancing the uses of aerial photography in ecological management

A TRADEMARK OF TECHNOLOGY IS THAT IT CHANGES

quickly, in the blink of an eye—or in this case, in the click of a camera's shutter. Aerial photography has been a staple of land assessment since the 1930s and, with the advent of satellite imagery in the 1970s and ongoing advances in digital photo analysis, its applications continue to multiply. In a survey of aerial photography characteristics, Morgan et al. (2010) describe the specific uses of applying digital analysis to traditional film photography to increase consistency, objectivity, and cost-effectiveness for applications to land management, in contrast to cheaper but often coarser satellite imagery.

Well-trained and seasoned interpreters of aerial photography, the authors say, are decreasing in number. A picture may be worth a thousand words, but without an informed interpreter, the potential for application of aerial photography to land management is all but lost. Enter digital photo analysis, made possible by scanning technology. Traditional aerial film photography may still be preferred over newer aerial digital photography because there is loss of spatial resolution with the latter. Though digital enhancement can mine a photograph for data sets beyond those available by simple visual examination, potential geometric (positional) displacements and radiometric (tonal or color) distortions abound in the process of taking and processing aerial photographs. Other factors are outside of the processor's influence—such as an unfocused lens, inappropriate flying height, or unfavorable weather conditions—and the quality of a film-based photograph ultimately depends on the quality of the camera.

The authors outline how eight primary characteristics of aerial photography are used in interpreting ecological features and, furthermore, how digital manipulation of aerial film photography can improve the accessibility of information. For those not trained in aerial photograph assessment, digital manipulation can be tantamount to a decoder ring. For instance, tone and color are used to identify soil composition and, by digitally manipulating the contrast, basic soil coverage images can become a major indicator of drainage rates. Likewise, size, shape, pattern, and shadow can be enhanced or manipulated to better identify foliage, and landscape use and structure.

Despite the challenges, Morgan et al. (2010) argue in conclusion that ecosystem research and management can be benefited greatly by using aerial photography to inventory specific foliage and even compile a history of topographical changes. With digital tools, the consistency and accuracy of aerial photography are advancing healthily. Traditional manual interpretation, subject to

the interpreter's experience level, can now be improved upon by automated analysis programs.

Reference

Morgan, J. L., S. E. Gergel, and N. C. Coops. 2010. Aerial photography: A rapidly evolving tool for ecological management. *Bioscience* 60(1):47–59.

—Jonathan Nawn, Mindi Davis, and Jeff Selleck

