Hand Held Computers Improve Rangeland Health Data Collection and Analysis

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Most British Columbia (BC) Ministry of Forests and Range (MFR) Range staff use paper forms to collect rangeland health data . They have requested improved methods of collecting and analysing data . Monitoring and tracking rangeland health with a hand held computer linked to a Global Positioning System (GPS) enhances field data collection and analysis . Range staff are beginning to use digital forms , a process which notably reduces the time taken to complete analysis and write reports after data collection . This paper outlines the need for advances in data collection , the practicalities of electronic data collection and the uptake of new technology by Range staff .

Prior to 2004 , Range staff collected field data with paper forms . A field day required a large paper map for navigation , clipboards to write on and water resistant paper forms to record observations . Staff carried a separate GPS unit to collect spatial data and transferred it to the paper form . Analyzing data and generating reports required three office days for each single day spent in the field . Field observations from one week generated a box full of forms which in turn required nearly a month to analysis and summarize .

The MFR model of electronic data collection requires a Personal Desktop Assistant (PDA) , GPS , and ArcPad mapping software to support data collection . Users navigate , orientate themselves and collect data within base layers downloaded from a central data repository and displayed on the screen of their PDA . Available information includes 5 metre resolution satellite imagery , contour lines , a vegetation layer and a blended biological , geological and climatic layer . Data are recorded in the form of shapefiles , which are directly compatible with the ArcMap programs used by the MFR geomatics specialists .

Effective electronic data collection requires an operator with knowledge of the ecosystem , PDA , GPS and appropriate protective cases . A compact flash or secure digital memory card of at least 1 gigabyte is necessary to store base imagery , useful shapefiles and inspection forms . Operators may find useful a telescopic pole to elevate the GPS and a mobile battery to extend field time . Most basic PDAs will have the necessary processing speed and radio receiver to operate the ArcPad software and link with a GPS . Total cost for equipment and software is between $2 ,000 and $3 ,000 .

Operating time with an extended battery is 6 to 7 hours . Users can increase field time by carrying a spare battery or mobile battery , or charging the PDA and GPS in the truck between inspections . Operators can partially fill out inspection forms in the field and edited them back in the office . The processing power of the PDA allows the operator to carry additional electronic information from each range client or a spread sheet to calculate rangeland carrying capacity . Collecting data with a hand held computer allows for consistent collection of information in the form of a permanent legible electronic file that is easy to store and sort . Electronic data collection can include recording range use , more elaborate inspections to determine rangeland health , identifying the location of range improvements , identifying the location of new invasive plants , determining the carrying capacity of a particular pasture , navigating in the field , linking digital pictures with the appropriate inspection form and recording additional notes .

Range staff have created a guide to system operation because users are located in different areas of the province . The guide addresses topics including : using ArcPad with electronic forms , acquiring and using underlying spatial data and addressing PDA challenges . New users are most successful in learning the technology when they are interested in it and recognize its benefits . Beginners often feel frustrated using this hand held electronic data collection system because they expect the speed and response of their personal computer and underestimate the importance of maintaining a line-of-sight between the GPS and the sky .

Range staff report that the conversion to electronic data collection reduces analysis and summary time by at least 75% . Unanticipated benefits of adopting the new technology include improved navigation and a visual summary of the extent of a monitoring regime , which improves the cost-effectiveness of subsequent field trips . Adopting this new technology is an important step to improving the understanding of the health of rangelands at a coarse scale . In the future , Range staff will be required to perform more mapping work while technological advances will likely provide us with faster PDAs capable of performing more tasks and processing finer resolution imagery .