Applying UAV Imagery to Minimize Impacts to Surface Water from Oil and Gas Well Pad Development[1]

M. P. Strager*, P. Kinder, S. Grushecky, J. M. Strager[2]

Abstract: Unmanned Aerial Vehicles (UAVs) have matured from recreational use by hobbyists to an essential geospatial and modeling tool for natural resource managers. UAVs now have improved flight planning software and can manage higher payloads to incorporate advanced sensors such as LiDAR for high-resolution elevation modeling. Extractive industry sites such as oil and gas well pads can be evaluated using UAV imagery and LiDAR data. These tools have the potential to provide high-resolution aerial imagery and remote sensing data. This information can assist inspectors in performing focused and strategic site inspections of erosion and sediment control practices in an efficient and effective manner. With increasingly stringent construction storm water regulations, inspections have become an integral component in ensuring adequate protection of our nation's waterbodies. In this study, we applied UAV aerial imagery and LiDAR data to map and track overland runoff at a gas well pad in West Virginia. A maximum likelihood classifier was used to classify the imagery and highlight disturbed areas of runoff. Next, we incorporated a landscape-based runoff model for total suspended solid (TSS) estimates to help identify sediment management locations. We found this technology provided very site-specific high-resolution information in a timely manner to effectively identify runoff sources, extent, and water quality from the well pad. The predicted TSS estimates indicated a potential risk to downstream biological conditions highlighting the importance and utility of this approach to monitoring such pad sites for this industry.[3]

Additional Key Words: landscape-based runoff modeling, sediment management, planning.

---

1. Oral paper presented at the 2019 National Meeting of the American Society of Mining and Reclamation, Big Sky, MT. Welcome Back to Montana: The Land of Reclamation Pioneers, June 3 - 7, 2019. Published by ASMR; 1305 Weathervane Dr., Champaign, IL 61821.
2. Michael P. Strager (* presenter), Professor of Spatial Analysis; Paul Kinder, Director, Natural Resource Analysis Center; Shawn Grushecky, Assistant Professor Energy Land Management; Jacquelyn M. Strager, Research Coordinator, Natural Resource Analysis Center, West Virginia University, Morgantown, WV 26506.
3. Work reported her was conducted near 39º 37' 17.76" N, 80º 16' 42.96" W.